Table of Contents

List of Tables

List of Figures

1.0 Introduction

This section describes the purpose of the park and park roads as well as the need for the proposed action. It also describes the scope of the Environmental Assessment (EA) followed by a discussion of previous studies. The section concludes with a brief discussion of the public involvement process.

1.1 Purpose of the Park

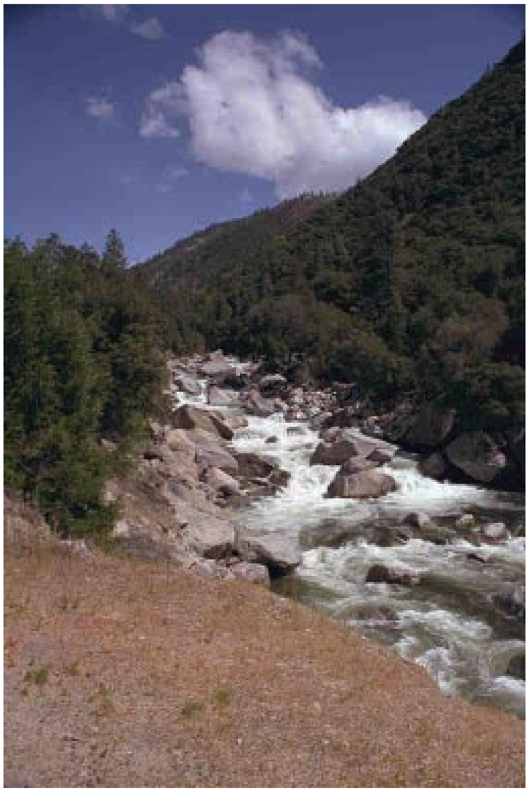
Enabling legislation for Yosemite National Park (Yosemite) defines two primary purposes for the park. The first purpose is the preservation of resources that contribute to Yosemite's uniqueness and attractiveness including its exquisite scenic beauty, outstanding wilderness values, diversity of Sierra Nevada environments, and historic and prehistoric cultural resources. The second purpose is to make the varied resources of Yosemite available to people for their enjoyment, education, and recreation now and in the future.

1.2 Purpose of Park Roads

"Park roads are intended to enhance visitor experience while providing safe and efficient accommodation of park visitors and to serve essential management access needs. The purpose of park roads remains in sharp contrast to that of the federal and state highway systems. Park roads are not intended to provide fast and convenient transportation."

The purpose of a park road as summarized in the "Park Road Design" memorandum, February 20, 1986.

Park roads provide the main access to our National Parks. The distinctive character of these roads sets the stage for visitor experience in the park. These roads are designed with extreme care and sensitivity with respect to the natural, cultural, scenic, and recreational values through which they pass. Park roads are often narrow, winding, and steep, but it is these very attributes that define the



El Portal Road parallels the Wild and Scenic Merced River as it flows through the Merced Canyon.

distinctive park-like character of these roadways. The character of these roadways entrains the visitors to all which lies beyond.

1.3 *Purpose and Need for the Proposed Action*

The proposed action would stabilize the roadway, reduce the likelihood of future road closures associated with flood events, facilitate regional transportation, and improve the safety of the road. The purpose of this EA is to evaluate the impacts associated with the reconstruction of El Portal Road necessary for Yosemite to accommodate visitors. This EA has been prepared to address the proposed road changes and enhance Yosemite's ability to preserve valuable resources including the roadway while providing access to the park now and in the future. The proposed action reflects the current needs of Yosemite and recent, ongoing, and reasonably foreseeable future changes in facilities, services, and visitor and park use. The following factors were selected to evaluate alternatives.

Protect cultural and natural resources.

Provide for visitor enjoyment.

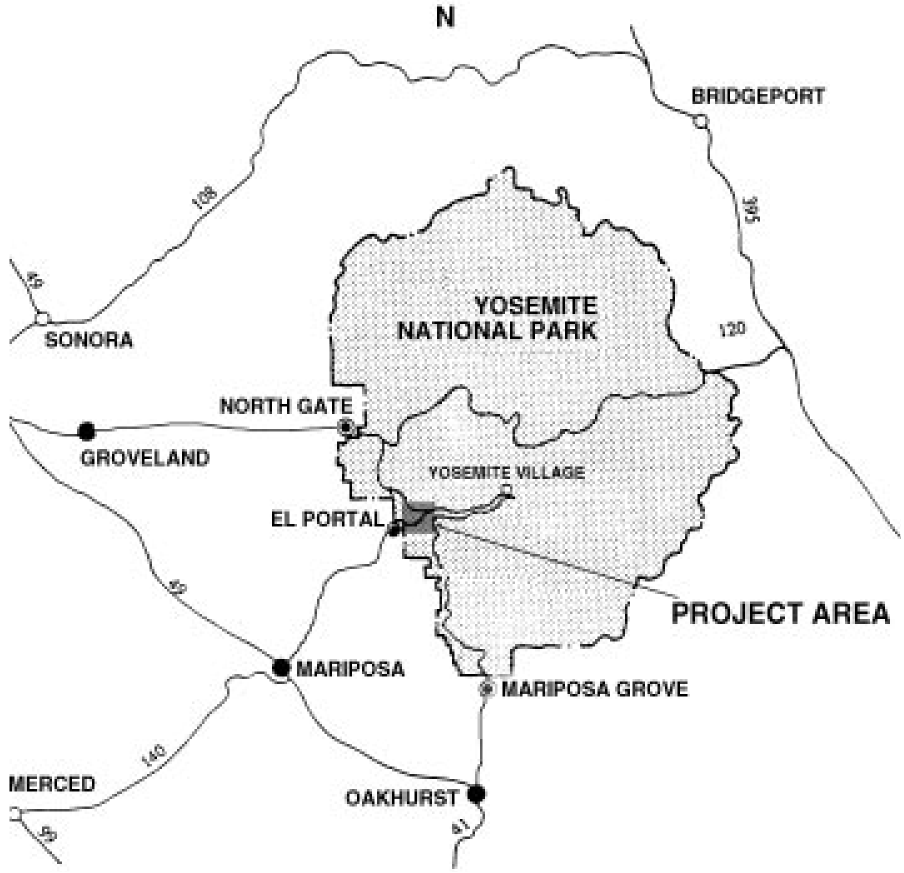
Improve efficiency of park operations.

Provide cost effective, environmentally responsible and otherwise beneficial development.

Being one of only three roadways providing access to Yosemite Valley, El Portal Road handles a quarter of the traffic to Yosemite National Park (Figure 1). The roadway (the portion of Highway 140 within the park) is sometimes the only access to

The January 1997 flood damaged guardwall, roadbed, and fill slope along El Portal Road. This site, and others like it, have since been repaired.

Figure 1.
Regional Area



Yosemite Valley during the winter months when snow and ice are prevalent at higher elevations on the two other entrance roads. The severe flooding that occurred from January 1 to 3, 1997 (Highwater 97a) damaged El Portal Road in 21 locations and weakened it in at least 30 others. Erosion destabilized many sections of the guardwall, roadbed, and fill slope (or "downslope", i.e., the area of fill beneath the roadbed sloping down to the river). Following Highwater 97a, road access was restricted prior to the start of Memorial Day Weekend 1997 while emergency repairs and safety improvements were underway.

The El Portal Road is essentially today as it was present in the late 1920s, a two lane roadway with nine foot lanes and a one foot shoulder. Over the last 80 years, the road has sustained serious flood damage eight times, requiring repair of bridges, sections of roadbed, guardwall, drainage features, and portions of road pavement. The drainage gutter and culverts are inadequate to accommodate the volume of water from rain and snow. The pavement is in fair condition, but is failing in some locations and is nearing the end of its useful life. The guardwall does not meet crash test safety standards. The lane width, lateral clearance, and horizontal curve radii (curve sharpness) do not comply with today's roadway standards, are all incapable of accommodating today's large vehicles, and contribute to the road's high accident record. The road experiences two to four times as many motor vehicle accidents as any other park roadway, and ten times as many accidents involving buses. To reduce the congestion in Yosemite Valley, as called for in the 1980 General Management Plan (GMP), it will be necessary to accommodate an increased number of buses entering the park. As it was before the flood, the road's nine-foot lanes poorly accommodated the bus traffic already on it.

1.4 Scope of Environmental Assessment

The project area generally includes the section of the Merced River Canyon containing El Portal Road and downstream habitat. El Portal Road is the 7.5 mile extension of State Highway 140 inside Yosemite from the park boundary (Parkline) to Pohono Bridge. The project area also includes five sites within the El Portal Administration Site considered for construction staging areas.

This EA is prepared in compliance with the National Environmental Policy Act (NEPA) (Public Law 91-190, 42 U.S.C. 4321-4347, as amended, the Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR 1500-1508), and National Park Service (NPS) Management Policies (1988). NEPA requires that agencies of the federal government implement an environmental impact analysis program in order to evaluate "major federal actions significantly affecting the quality of the human environment." A "major federal action" may include projects financed, assisted, conducted, regulated, or approved by a federal agency. NPS Management Policies implement the NEPA process for NPS lands and operations.

In accordance with NEPA and NPS Management Policies, Yosemite has prepared this EA to assess the potential environmental impacts resulting from the proposed improvements to El Portal Road. This EA identifies, evaluates, and documents the effects of roadway reconstruction, relocation of the entrance station, addition of rest room facilities, and modification to Cascade Creek drainage structures. The existing conditions in Merced River Canyon constitutes the baseline for the effects of the proposed actions. The baseline condition reflects the current state of the environment including the recent effects of the January 1997 flooding.

An interdisciplinary team of planners, scientists, engineers, archeologists, park service technicians, and landscape architects analyzed the proposed action against existing conditions and identified the relevant beneficial and adverse impacts associated with the action. In order to assess the full range of potential impacts the following resources have been evaluated.

Climate

Geology and Soils

Hydrology and Water Resources

Air Quality

Noise

Vegetation

Wildlife

Sensitive Species

Cultural Resources

Land Use

Utilities

Transportation

Visual Resources

Socioeconomics

This EA is comprehensive in scope in order to meet the requirements for an effective and coordinated environmental planning process. Comprehensive assessments examine the impacts of related projects expected to occur as part of a larger program of activities. By identifying expected future development, comprehensive assessments put particular project activities and their impacts into a broader geographical, environmental, and developmental context.

A wide variety of available data and results from previous studies have been consolidated into this comprehensive EA. The consolidated data and analysis contained in this EA will enable it to serve as a resource and planning baseline document for subsequent projects and activities occurring in the study area.

1.5 Previous Environmental Studies and Technical Reports

To develop the sections of this EA related to the affected environment and environmental consequences, a comprehensive review was conducted on the existing data prepared for project specific planning documents. These documents are incorporated into this EA by reference in their entirety and by specific citation where applicable. For ease of reference, this section provides a list of those documents incorporated by reference in their entirety. When a portion of a document is used for detailed reference material on a case-by-case basis, that document is cited within the text, and a specific reference is contained in the citation. The documents (all specific to Yosemite National Park) incorporated by reference are listed below:

Final Environmental Impact Statement: General Management Plan. 1980.

Environmental Assessment for Electrical Distribution System Replacement and Cascade Dam Removal. 1987.

Assessment of Hydraulic Changes Associated with Removal of Cascade Dam, Merced River. 1989.

Concession Services Plan Environmental Impact Statement. 1992.

Environmental Assessment: Draft Yosemite Lodge Area Development Concept Plan. 1997.

Highwater 97a: Yosemite Flood Recovery 1997. 1997.

Analysis of the Hydrologic, Hydraulic and Geomorphic Attributes of the Yosemite Valley Flood: January 1-3, 1997. 1997.

Draft Valley Implementation Plan. 1997.

Environmental Considerations for Planned Safety Improvements During Emergency Repair of El Portal Road Between Parkline and Pohono Bridge. 1997.

Detailed Assessment Report: Yosemite National Park Highwater 97a. 1997.

ERFO Report: Yosemite National Park Highwater 97a. 1997.

1.6 PUBLIC PARTICIPATION

A critical part of Yosemite's planning process is public involvement. The general public, federal, state, and local agencies and organizations are being provided the opportunity to raise their concerns regarding the environmental and socioeconomic effects of the proposed action and alternatives regarding El Portal Road. Comments and questions on Yosemite National Park programs, activities, proposed actions, and/or environmental issues should be directed to the Yosemite National Park Public Information Office. Copies of materials and information concerning activities (including the safety improvements to El Portal Road during emergency repair) and proposed actions (including El Portal Road Improvements) are available from this office at the following address and phone numbers:

Yosemite National Park Public Information Office
Administration Building
Cemetery Road
Yosemite Valley, California 95389
(209) 372-0261 and (209) 372-0265

This EA is also available on the internet at the following address: http://www.nps.gov/yose

Persons and agencies are invited to provide comments from May 7 to June 6, 1997 during the public comment period. Comments can be submitted in writing to the Public Information Office, via e-mail at El_Portal_Rd_EA@nps.gov, and/or at the open houses described below. Written comments on this draft will be addressed during the finalizing of the EA.

Yosemite is hosting three open houses (one each in San Francisco, Mariposa, and Yosemite Valley, California) which will include exhibits about existing road conditions, the proposed action and alternatives, environmental considerations, transportation issues, and construction design and procedures. Professional staff will be available at the open houses to answer questions and to accept comments on the draft EA. In addition to over 1,600 invitations to the open houses made through the Yosemite Planning Update Newsletter No. 6, persons are invited to participate through this draft EA, flyers, and newspaper articles resulting from news releases. The open house schedule is as follows:

May 20, 1997
San Francisco, California
5:00 PM to 8:00 PM
Golden Gate National Recreation Area
Fort Mason Headquarters Building (Building 201), Golden Gate Room
Corner of Bay and Franklin

May 21, 1997
Mariposa, California
5:00 PM to 8:00 PM
Comfort Inn, Evergreen Room
4994 Bullion Street
Behind Pioneer Village Shopping Center

May 22, 1997
Yosemite Valley, California
12:00 PM to 3:00 PM
East Auditorium
Behind the Visitor Center

Yosemite has solicited the involvement of interested groups and agencies at meetings during the early stages of EA development and the public comment period. During the draft EA public comment period, a government agency briefing with a round-table discussion will be held. Representatives from agencies and organizations are also invited to attend a site visit and the open houses.

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2.0 Existing Conditions

2.1 History of El Portal Road

El Portal Road has been instrumental in bringing visitors to Yosemite National Park for ninety years, especially in the winter. The road (State Route 140) is a two lane highway that provides access to Yosemite National Park from communities west of the park. State Route 140 passes through Merced, Mariposa, and El Portal on its way to the park boundary (Parkline). Inside the park, the two-lane roadway is called El Portal Road and continues to Yosemite Valley. The roadway is open year round and is sometimes the only road open to Yosemite Valley during the winter months when snow and ice are prevalent at higher elevations on the park’s major roadways. Thus, El Portal Road is referred to as the “All-Year Highway”.

One primary impetus behind the initial construction of the road was the need for year-round access to Yosemite Valley, which water (in the form of ice and snow) often prevented during winter over other early roads (Greene 1987). The irony arises from the reoccurring, though sporadic, damage to the road by flooding of the Merced River. The El Portal Road sustained major flood damage in 1924, 1937, 1950, 1955, 1964, 1969, 1983, and 1997 (Greene 1987, Quin 1991).

The earliest portion of the El Portal Road completed was between the Pohono Bridge and Cascade Creek. This stretch was part of the Coulterville and Yosemite Turnpike (or Coulterville Road), a private toll-road completed in 1874 (Quin 1991). The Coulterville Road extended from the town of Coulterville through Foresta and then down the canyon side to the Merced River just below Cascade Creek (Greene 1987). From that point it continued up the north bank of the Merced into Yosemite Valley. Another portion of what was to become the El Portal Road was a trail that extended about a mile upstream along the Merced from Hennessey Farm (now El Portal), before diverging from the river bank (Greene 1987). This rugged trail became the winter mail route for Yosemite Valley, but it was very difficult to travel (Greene 1987).

<Body texIn 1907, after two years of construction, the Yosemite Valley Railroad was completed from Merced to its terminus at El Portal (Greene 1987). Prohibited from extending its rails into park property, the railroad company constructed a dirt wagon road from the park boundary to the existing Coulterville Road below Cascades (Quin 1991). Thus, the construction of the basic route of El Portal Road started in 1905, was completed in 1907.

Within a few years, the railroad and El Portal Road were carrying the majority of park visitors (Quin 1991), but the road was so rocky and dusty that park staff identified it as a major impediment to visitor enjoyment of Yosemite (Greene 1987). Because the park was closed to private automobile access from 1907 to 1912 (Greene 1987), most travel on the road was by stagecoach or wagon (Quin 1991). In 1913, partially due to the recommendation of John Muir, access was opened to the park for automobiles, and improvement of the El Portal Road became imperative (Greene 1987).

<BWork began on widening the road between El Portal and Pohono Bridge in 1913 (Quin 1991). From its original 10 foot width, the roadbed was widened by blasting and filling to 25 feet to accommodate a guard wall, drainage, and an 18-foot road surface (Greene 1987). Although many improvements and repairs have been made since that time, the basic road dimensions remain the same today.

In the early 1920's, because of continuing pressure from motorists' groups, the State of California began the construction of the "All-Year Highway" (Highway 140) from Merced to El Portal. By 1923, this paved highway had been extended as far as Briceburg, 17 miles below El Portal, and the California Highway Commission programmed construction of those remaining 17 miles (Quin 1991). In 1924, Congress appropriated funds to upgrade the El Portal Road to meet the expected increase in traffic demand. The improvements to the roadbed, surfacing with crushed rock, and construction of a new entrance station at Arch Rock were completed by the end of 1926 (Quin 1991). The guard wall along the river side of the road was greatly extended during 1927 and 1928. Additional improvements were made at the Arch Rock entrance from 1927 to 1929 (Quin 1991).

The current Pohono Bridge, at the Yosemite Valley end of the El Portal Road, was constructed in 1928 (Greene 1987). In 1931 and 1932, the road shoulders were widened in places, and 46 turnouts with attendant rock work were constructed (Quin 1991). Over the last 70 years, since completion of the last major features of the road, the road has been resurfaced several times, the opening in Arch Rock was enlarged by blasting in 1948, and a sewer line was laid under the road in 1977 to the new sewage treatment plant in El Portal (Quin 1991). Within the same time period, the road has sustained serious flood damage eight times, requiring reconstruction of bridges, sections of roadbed, guard walls, drainage features, and portions of the road surface (Greene 1987, Quin 1991). Rock slides and the 1990 A-Rock (Arch Rock) forest fire have also closed the "All-Year Highway" for brief periods.

2.2 RECENT FLOOD EVENT

The information contained in this section is from the draft Analysis of the Hydrologic, Hydraulic and Geomorphic Attributes of the Yosemite Valley Flood: January 1-3, 1997 (Jackson et al. 1997).

On January 1-3, 1997, Yosemite National Park endured its greatest deluge of floodwater since 1955. The combination of snow pack and heavy rain caused a high water event (Highwater 97a) which resulted in extensive, severe damage to roads, utilities, buildings, campgrounds, and other visitor and park facilities. Highwater 97a is the largest flood in over an 80-year period of stream gage record on the Merced River. As the water receded, it became graphically apparent that many of the park's roads, utilities, and other facilities were not designed to withstand even a less severe flood.

The pull-out lane at Windy Point was washed out by Highwater '97a. This area is currently under repair.

Flood discharges are measured at two U.S. Geological Survey (USGS) stream gages on the Merced River within the park, the Happy Isles stream gage located at the upper end of Yosemite Valley (the valley) and the Pohono stream gage located at the lower end of the valley immediately upstream from Pohono Bridge. The peak flood stage at the Pohono stream gage exceeded the height of the stream gage stilling well and was not measured directly; however, a peak stage of 23.45 feet was accurately estimated from the high-water mark on the gage house. The peak discharge was estimated by the USGS to be 24,600 cubic feet per second (cfs). These depth and volume values exceed the previous record of 21.52 feet and 23,400 cfs measured in 1955.

Although Highwater 97a is the largest flood on record, it was only slightly larger than the flood of 1955, and not an unusual flood when viewed within the context of the 80-year period of record. This flood closely approximates a 100-year return period flood, estimated to be slightly larger than the one percent chance (100-year) flood for the Merced River at Pohono Bridge. A 100-year flood has about a 39 percent chance of occurring over a 50 year period, and about a 63 percent chance of occurring over a 100 year period.

To characterize Highwater 97a, the flood analysis divides the Merced River into five geomorphic reaches. The proposed improvements in this document are in Reaches 1 and 2. Reach 1 extends upstream from El Portal to the diversion dam located at the junction of El Portal and Big Oak Flat Roads. In this reach, the Merced River is generally straight with steep gradient (approximately 350 feet per mile) and well confined by canyon walls. The riverbed is comprised of bedrock, large boulders delivered by rock fall, and very large (boulder-size and larger) fluvial material. The flood in this reach was deep (15-30 feet) and generally confined by canyon walls or by the road prism. (The road prism is defined as the area between the top of the cut and the toe of the fill on which the road is built.) Velocities were extremely high and flows were supercritical. Stream power and sediment transport energies were enormous. At some locations enough canyon width existed for the pre-flood river to meander within the channel and establish side-channel bar deposits. During the flood, the river went straight down the canyon, typically cutting off bar deposits and scouring any vegetation established on them. Very little disturbance to the hill slope (non-riparian) natural resources was observed in undeveloped reaches downstream from the diversion dam. Reach 2 extends upstream from the diversion dam and includes Pohono Bridge, the eastern extent of the proposed improvements (project area).

Most adverse impacts of the flood are to infrastructure, and where adverse impacts to natural resources occur, it is usually the result of the interaction of flood flows and infrastructure. The primary flood effects in Reach 1 involve impacts to the road and utility corridor. In some places, this deep, high energy flood was powerful enough to mobilize the rock rip rap placed to protect fill material used to construct the road prism. This resulted in erosion of the road prism and undermining of the road surface. In other places, high energy flows over-topped and flowed down the road. This resulted in erosion of fill material under the road surface which eventually undermined the surface causing failure and / or wash out.

2.3 CURRENT USE

Being only one of three roadways providing access to Yosemite Valley, El Portal Road handles a significant amount of the traffic at Yosemite. Peak season statistics (1992) indicate that 24 percent of the traffic entering the park entered through the Arch Rock Entrance Station by way of El Portal Road. The total average daily traffic for both directions on El Portal Road during the peak season was 2,950 vehicles. (BRW 1994) Of this volume, approximately 6 percent are heavy vehicles including buses (1.3 percent), recreational vehicles (2.4 percent), and trucks (2.5 percent) (LS&C 1991). The roadway carries approximately 40 percent of the bus volume in the park. During the off peak winter months El Portal carries up to 45 percent of the total traffic entering Yosemite National Park. Travel on El Portal is heaviest eastbound in the morning between 8:00 AM and 9:00 AM and westbound in the evening between 5:00 PM and 6:00 PM. These peak hours correspond with the commuting demand of National Park Service (NPS) and concessionaire employees. Tourist travel is heaviest during the middle of the day between 11:00 AM and 12:00 PM. (LS&C 1991)

Level of service (LOS) is a measure of quality of service being provided to a driver by a roadway, ranging from LOS A (free-flow, high speed travel) to LOS F (congested

After the January 1997 flood, road access was restricted on El Portal Road to accommodate flood recovery construction traffic.

and stop and go travel). El Portal Road operates at LOS E. LOS C or better is considered an acceptable LOS for a two lane highway. El Portal Road's undesired LOS is a result of the steep grade, minimal lane width, and inadequate lateral clearance, not high traffic volume (LS&C 1991). However, as previously mentioned in Section 1.2, parks roads are not intended to provide fast and convenient transportation.

2.4 Projected Use

The future traffic use of El Portal Road is dependent on several planning processes that are currently underway. Currently, Yosemite has unrestricted visitor and vehicle access. (Except for oversize vehicles which are restricted.) Entry into the park is not limited except when traffic congestion becomes extreme. Access to the park was restricted for seven weekends between May and July 1995 (NPS 1996). A vehicle reservation system set at the capacity of the park established in the GMP will eventually be proposed. If a reservation system is implemented, peak season daily traffic volumes on El Portal Road will be less than currently observed. However, yearly volumes could continue to grow as more visitors visit Yosemite in non-peak months.

Another access proposal changes the internal circulation of traffic in Yosemite Valley by creating an in-valley staging area. At the staging area, visitors would have to park their vehicle and board the Valley Shuttle when visiting Yosemite Valley. This proposal would not have any effect on the future traffic volumes on El Portal Road.

An out-of-park staging area is being considered as part of a regional transportation planning process, the Yosemite Area Regional Transportation Strategy (YARTS). Visitors would park their vehicles at a remote parking area outside the park and take an alternative mode of travel (non-private vehicle) to Yosemite Valley, and then transfer to the Valley Shuttle. Out-of -park staging area alternatives could reduce the number of vehicles that use El Portal Road significantly. However, the proposals will increase the number of commercial vehicles carrying passengers on El Portal Road.

2.5 Safety Issues

Upon reviewing the history of the construction, reconstruction, and improvements made over time to El Portal Road, it is apparent that the roadway is essentially today the same as the road present in the 1920s. El Portal Road is, as it was in 1920s, a two lane roadway with nine foot lanes and a one foot shoulder. The road has a typical vertical grade between five and seven percent with one section reaching a maximum of almost nine percent. El Portal Road parallels the Merced River as it flows through the Merced Canyon. There are many horizontal curves that do not comply with today's roadway standards, having radii of less than 220 feet, and some curves have as little as a 100 foot radius (LS&C 1991). Thus, many of the curves on El Portal Road are dangerous for today's traffic because they are sharp and provide limited sight distance.

Sharp turns and the close proximity of rock to the edge of the travel lane impairs the ability of drivers, especially of large vehicles, to keep to the right of centerline.

The north side of the roadway is bordered by rocks and cliffs that align up against the edge of the roadway pavement. The south side is bordered by a rock wall at the edge of pavement. These obstacles provide inadequate lateral clearance on both sides of the roadway for the majority of its length. The pavement on El Portal Road is in fair condition but is failing in some locations, nearing the end of its useful life. The current lane widths, lateral clearance, and horizontal curve radii do not conform with American Association of State Highway Transportation Officials (AASHTO) standards and have significant geometric deficiencies (LS&C 1991).

The NPS is responsible for the maintenance and enforcement of traffic control on El Portal Road. The speed limit on El Portal Road is posted at 35 mph with lower advisory speeds posted around the sharp curves. Some curves are posted with a 20 mph advisory speed. The speed limit for buses, recreational vehicles, and trucks is 25 mph.

Oversize vehicles are restricted on El Portal Road within the park because the road is narrow and winding. These restrictions are summarized in Table 2.1. Any vehicle exceeding these restrictions must be lead by a pilot vehicle with a sign indicating “Oversized Load Follows”. Oversized vehicle escorts can occur daily between 11 p.m. and 7 a.m. throughout the year. Between October 1 through March 31 on non-holiday weekdays, oversized vehicle escorts can occur at any time. Oversized restrictions on El Portal Road are stricter than restrictions established by the State of California on Highway 140 outside the park.

Table 2.1. El Portal Road Oversized Vehicle Restrictions

Dimension	Value not to exceed
WIDTH	
Vehicles excluding buses	8 feet
Buses	8.5 feet
HEIGHT	
All Vehicles	13 feet 4 inches
LENGTH	
Single Vehicle	40 feet
Trailers	35 feet (from kingpin)
Combination Vehicles	60 feet

An accident study for Yosemite National Park was conducted in 1985. The study analyzed accident data from 1981 to 1984 for all major roadways within the park. The geometric deficiencies along El Portal Road lead to an extremely high accident rate on the roadway especially for large vehicles including recreational vehicles and buses.

During the three and a half year time period, 173 accidents occurred on El Portal Road. The accident rate calculated for El Portal Road from the study is 16 accidents per million vehicle miles of travel. The accident rate on El Portal Road was double the rate of any other roadway in the park. Over 30 percent of the accidents involved heavy vehicles. The accident rate for buses was 157 accidents per million vehicle miles of travel. This accident rate for buses is ten times higher than the rate of any other roadway in the park (Kimley-Horn 1985).

The most prevalent accidents on El Portal Road are sideswipe accidents. They account for over 60 percent of the total accidents on the roadway. Sideswipe accidents are common on roadways with geometric features similar to El Portal Road. Often sideswipe accidents are the result of a vehicle crossing the centerline of the roadway and making contact with an oncoming vehicle, or causing the oncoming vehicle, in an attempt to avoid the collision, to move toward the right hand side of the lane and make contact with a roadside obstacle. The rock wall is often hit by eastbound drivers and the rock cliffs or large boulders by westbound drivers. The shying away from roadside obstacles and sharp turns is usually the reason for vehicles crossing the centerline. This is especially true for buses and recreation vehicles since their eight-foot-wide vehicles fill the travel lane. Run-off-the-road accidents (11 percent) and rear-end accidents (8 percent) were the next most common type of accidents (Kimley-Horn 1985).

Many of the accidents on the other roadways in the park are caused by poor weather conditions, while the majority of the accidents on El Portal Road occurred in good weather. Although the accident study is over a decade old, no major improvements have been made to the roadway and the same types of accidents occur every year. No fatalities occurred during the time period covered by the study, however, fatalities have occurred on El Portal Road since then. The geometric deficiencies of El Portal Road are the contributing factor to accidents on the roadway especially for large vehicles (Kimley-Horn 1985).

A traffic safety program review of traffic accident data between 1990 and 1993 was performed to update the 1985 study. The accident review closely mirrored the results of the 1985 study. Accidents rates on El Portal Road increased to 18.5 accidents per million vehicle miles of travel (Robert Peccia and Associates). This accident rate for El Portal Road for this period has increased to almost four times higher than any other road within Yosemite National Park. The severity of these accidents is low, the majority of which continue to be sideswipes. Any accident, however, regardless of how minor, is a nuisance to the persons involved and adversely affects visitors experience to the park. Thus, it appears as volumes on El Portal increase, accidents rates have also increased. The accident rate on El Portal Road will remain high until geometric improvements are made to the roadway.

3.0 Description of Alternatives

3.1 *Development Of Alternatives*

Alternatives analyzed in this EA were determined through a collaborative effort among the NPS Denver Service Center (DSC), the FHWA Central Federal Lands Highway Division, and Yosemite National Park. Representatives from these organizations formed a "Partnering Team" to create a strategy for organizational effectiveness in completing a successful design for the reconstruction of El Portal Road. One of the goals of this team was to define the conceptual alternatives for evaluation under the EA which meet both environmental needs and the intended purpose of the roadway.

To select alternatives for evaluation, the team established minimum standards that any viable alternative would have to meet, established specific goals for the design, and established objectives for a value analysis of competing functions of various road design elements. Minimum standards for any viable alternative are described below:

Maintain the park-like character of the road corridor. These characteristics include curvilinear alignment, road features such as guardwalls, retaining walls, significant natural features, and drainage catchments.

Road needs to continue to follow/parallel the river.

Roadway design should be able, as possible, to withstand a flood event similar to Highwater 97a..

Cross drainage should be designed to handle a 25-year event.

Retaining walls should be designed for a 75 year life.

Pavement surface should have a 20 year life.

Road geometry should allow buses to remain to the right of centerline.

Guardwall should be crash-worthy and be 27 inches high.

Curb height should not exceed 6 inches.

In addition to these overall project goals, the Partnering Team completed a "value analysis" to evaluate various road design elements. This process is a decision-making tool used to select viable alternatives. Value analysis identifies the relative trade-off of catoring towards various competing road design elements. Each element of the road design serves specific purposes which can sometimes conflict. For example, the functions of road alignment and width include providing a safe corridor for vehicular traffic and providing visitor enjoyment. If safety was the primary design consideration, a wide, straight road would be the result. However, such a road design would occur at the expense of visitor experience and the historic curvilinear alignment (cost would also be prohibitive).

Another purpose of value analysis is to consider the competing interests of various stakeholders. Stakeholders range from government agencies (such as the NPS, U.S. Fish and Wildlife Service (USFWS), FHWA, U.S. Army Corps of Engineers (COE), various California state and agencies, etc.) to local government agencies, to private interest groups, to public users (cars / bus drivers, RVs, delivery vehicles, etc.). Value analysis is one way to objectively analyze the advantages and disadvantages of various alternatives against specific interests and criteria. Improvements to El Portal Road were evaluated considering the ability of each alternative to:

Recognize the relationship between El Portal Road and the values of the NPS

Be sensitive to budget and schedule

Provide direction for project design and validate design concepts

Balance resource protection with visitor experience

Justify and achieve a cost effective level of improvement

Minimize environmental impact and optimize protection of resources from a long term perspective

Preserve the integrity and park-like character of the road corridor

Use appropriate construction methods/materials for road features (guardwalls, retaining walls, and drainage structures)

Ensure the resultant design is constructable, operable, maintainable, and affordable.

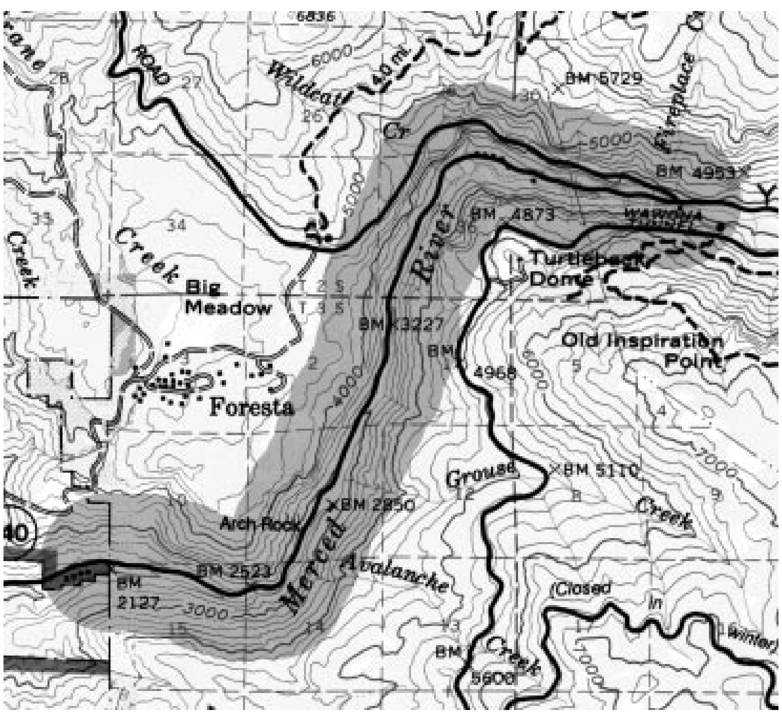

Figure 2. Project Area

3.2 IDENTIFICATION OF ALTERNATIVES

Based on the above standards, project goals, and value analysis objectives, for analysis in this environmental assessment, the Partnering Team identified a no action alternative and two alternative actions that could occur along the road corridor.

For the proposed action, two different design alternatives were considered for the new roadway cross-section. One design considers a typical two-lane roadway section revised from NPS road standards.

Table 3.2 provides a summary of identified direct and indirect impacts associated with the no action and proposed action alternatives.

The other design, the proposed alternative, is similar but the road surface is not as wide. Both cross-section designs meet NPS needs. These design standards are different from normal highway standards, but are permitted by a Senate report accompanying the Federal-Aid Highway Improvement Act of 1982. The report states,

> *"Roads through areas administered by federal land managing agencies must be carefully designed to protect important natural and cultural resources under the jurisdiction of those agencies. Such roads must be designed to blend in with the natural landscape. Because of the resources preserved in the federal land management areas, and the type of tourist use in such areas, the roads in certain instances do not have to be constructed to normal highway standards."*

The existing slope of the river in some areas is no longer structurally stable enough to support the roadway.

3.2.1 No Action

Under no action, the existing roadway would not be improved, except for emergency repair work and six safety improvements (SAIC 1997) currently ongoing as part of flood recovery efforts. This work will continue

The existing culverts are insufficient in both size and number to accommodate drainage flow.

prior to the start of Memorial Day Weekend 1997. Maintenance activities would also continue (Table 3.1).

Table 3.1. Maintenance Activities

Maintenance	Activity
Culvert	Cleaning to keep clear and functional. Also maintaining culvert heads to ensure drainage goes through the culvert.
Debris Clean-Up	Removal of rock fall, tree fall, and earth slides.
Guardwall	Repair damage usually from rock fall and vehicle impacts as necessary. Completed by a six-person crew.
Pavement	Pothole repair, crack sealing, and blade patching as necessary.
Pavement Marking	Maintain recessed markers and pavement stripping.
Signage	Replacement as needed usually due to weather damage.

The average existing roadway width is 24 feet 6inches. This includes asphalt concrete gutter, varied width (up to 3 feet); asphalt concrete pavement, average width 19 feet 6 inches; and existing guardwall, ranging from 20 to 27 inches high with a 26 inches wide base (Figure 3.1). Under no action, the following existing conditions would persist:

The nine-foot travel lanes poorly accommodate large vehicle traffic.

The pavement is in fair condition, but is failing in some places and is nearing the end of its useful life.

Retaining walls are bulging/flexing under repeated loads and nature's action.

The roadbed is settling in some places where it consists of organic material (such as tree limbs and soil).

The existing guardwall does not meet American Association of State Highway and Transportation Officials (AASHTO) crash test safety standards.

The lateral clearance on both sides of the roadway is inadequate for most of the road's length. The cut slope consists of rock and cliffs that align up against the edge of the pavement, impairing the sight distance around curves. The river side is bordered by the guardwall at the edge of the pavement. Drivers tend to shy away from these obstacles which impair their ability to keep their vehicles to the right of centerline.

The horizontal curve radii (curve sharpness) do not comply with today's safety standards (too sharp), impairing sight distances around curves and the ability of drivers to keep their vehicles to the right of centerline.

The intersection of the El Portal and Big Oak Flat Roads is hazardous due to alignment; stopped eastbound at the intersection on Big Oak Flat Road, it is

"The sewer main is corroding in places and will be replaced/ repaired under no action or the proposed action."

difficult to see free-flowing eastbound El Portal Road traffic. The turn is too tight from eastbound El Portal Road to westbound Big Oak Flat Road and from eastbound Big Oak Flat Road to westbound El Portal Road. The sight distance of the westbound approach is limited due to road alignment (curvature), lateral clearance, and grade.

There are approximately 18 pull-out areas along El Portal Road, some of which have a negative impact to natural resources.

Drainage structures have lost their structural integrity and functionality over time. The road's drainage capabilities are inadequate to accommodate water flow volumes from precipitation events. The culverts are insufficient in both size (12 and 18 inches) and number.

Much of the cut slope consists of impermeable material (rock). The gutter is not large enough to accommodate run off from the cut slope or drainage and often becomes clogged with pine needles, rock, and erosion material. In some places, water drains on and across the travel lane surface, creating dangerous slippery conditions.

The three 84-inch culverts at the Cascades Creek crossing are not adequate to accommodate flow volumes due to the dynamic nature of the Cascades watershed. The current flows of Cascades Creek is split evenly between the culverts and the bridge and there is poor access to the river.

The seven percent road grade west of the Arch Rock Entrance Station is not an area conducive for stopping while waiting to pay entrance fees. Prior to the entrance station there is not sufficient parking, pull out, or turn around areas.

Rock features such as Dog Rock, Arch Rock, and Split Rock (pictured left) will be preserved in both No Action and the alternative actions.

The absence/lack of adequate public toilets at Cascade Falls parking lot and picnic area, the Cascade Diversion Dam, and along the river detracts from visitor experience and threatens water quality and public health.

The sewer line in some places has debris built up and the pipe is corroding. This will be repaired/replaced as necessary under no action or the proposed action.

There are precast concrete pull boxes with conduit that run the length of El Portal Road underground 400 feet apart. These concrete pull boxes provide utility access. The conduits are empty except for a 12,000 kV power line from the Powerhouse to Yosemite Valley. Modifications to this condition are covered under a separate environmental document (NPS 1987).

Grouted rip rap is used to stabilize fill slopes; rock is placed by an excavator then concrete is added between rocks.

3.2.2 11 FT. TRAVEL LANES (PROPOSED ACTION)

The proposed action includes: widening travel lanes; repaving the road; rebuilding the guardwall to meet safety standards; increasing lateral clearance by removing rock from the cut slope (or “upslope”, i.e. the hillslope sloping up from the roadbed); decreasing sharp curves by realigning the roadway; improving road drainage by constructing a drainage ditch and increasing the size and number of culverts; revegetation; construction of retaining walls; and relocating the entrance station from west of Arch Rock to the park boundary (Parkline). The proposed action also includes mitigation measures necessary to avoid significant impacts to the environment (refer to Section 6.0). The proposed reconstruction would improve roadway safety by enhancing the ability of all drivers, especially of large vehicles, to keep their vehicles to the right of centerline. It also would improve structural integrity by strengthening the ability of the road to withstand future flood events.

This alternative improves the road by constructing: a one-foot curb, a three-foot drainage ditch, two 11-foot travel lanes, a paved one-foot shy distance between the travel lane and guardwall, a 27 inch high guardwall with a 26 inch wide base, and a one-foot paved shoulder with a 3 to 1 slope ratio foreslope between the travel lane and fill slopes without guardwall (Figure 3.1). The proposed action is to improve El Portal Road from park boundary (Parkline) to Pohono Bridge including reconstructing the road and adding visitor facilities. Maintenance activities would continue as described above. Under the proposed action, the following activities would occur:

Widen travel lanes to eleven feet.

Repave the road.

Construct the roadbed with crushed aggregate base to prevent road surface settling.

Rebuild the guardwall to meet safety standards where guardwall currently exists. Add guardwall where necessary for safety.

Leave historic guardwall in turn out areas where possible. Rebuild the guardwall using a real stone surface in turn out areas requiring guardwall.

Remove rock where sight distances are significantly impaired and provide a paved shy distance between the edge of the travel lane and the guardwall. Rock character features of the roadway such as Dog Rock, Arch Rock, and Split Rock would remain the same.

Correct significant geometric deficiencies by slightly realigning the roadway.

Increase the size of all culverts to at least 24 inches and install approximately twice as many.

Construct the road with grades sufficient for proper drainage. Construct a three-foot paved drainage ditch with a one-foot curb to accommodate flow volumes. Install an concrete curb to protect the ditch during maintenance operations and to seal the ditch from the cut slope to prevent water from getting under the ditch.

Replace the existing culverts south of the Cascade Creek Bridge with a box culvert.

Contingent upon the completion of a land exchange, relocate the entrance station at the park boundary (Parkline). The visitor facilities near Arch Rock would

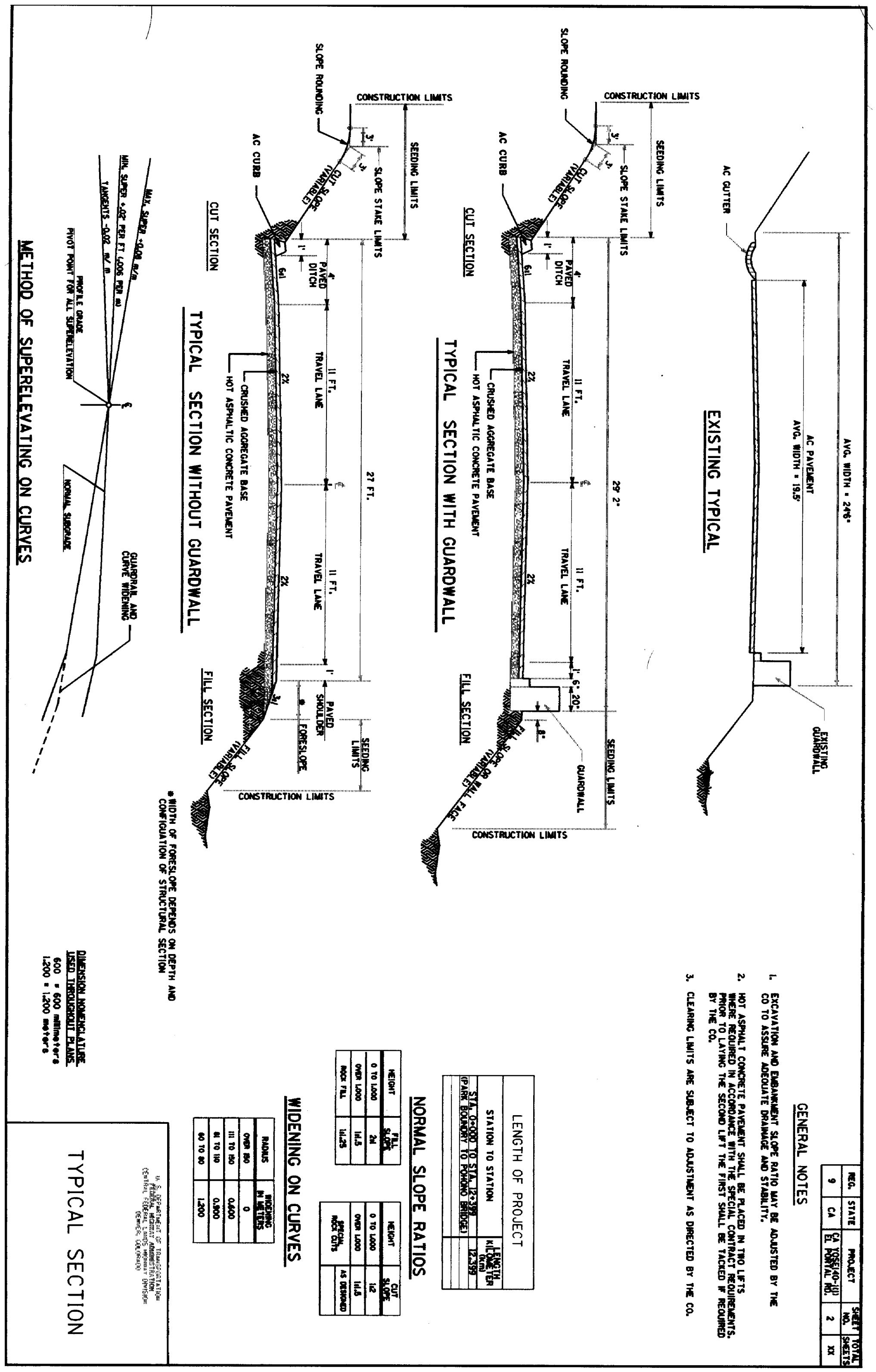

Figure 3.1. Eleven-foot travel lane alternative.

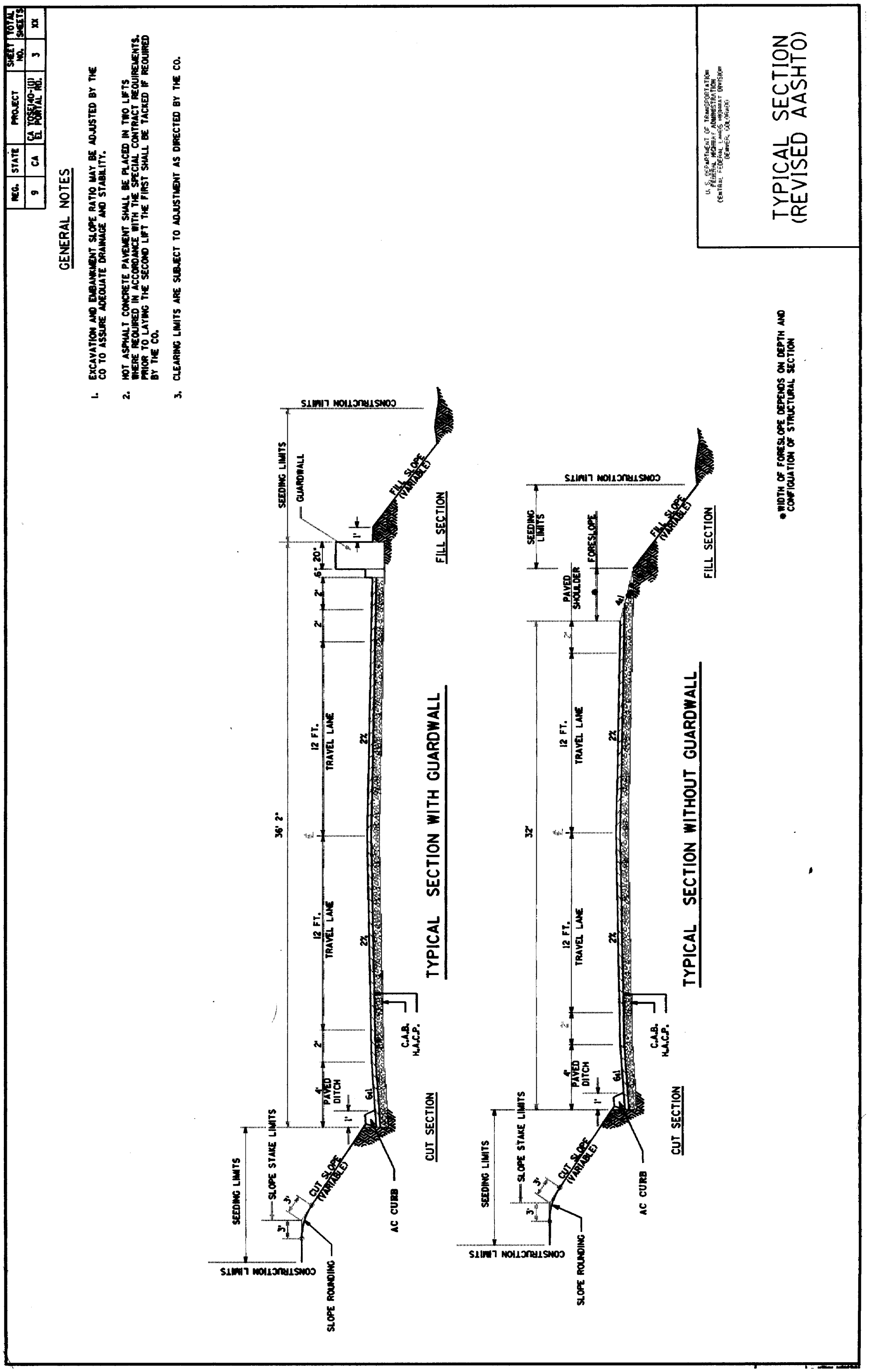

Figure 3.2. Twelve-foot travel lane with two-foot shoulders alternative.

basically remain the same with enhanced interpretive information. The primary function of a new visitor facility at the park boundary (Parkline) would be fee collection.

Construct/replace public toilets which meet modern standards for personal and environmental health at Cascades (four flush), the dam (one vault), and along the river between Pohono Bridge and the dam (one vault) (YOSE 1996).

Redesign the El Portal/Big Oak Flat Road intersection to improve safety. This includes the removal of Cascade Dam, which is next to the intersection, as addressed in a separate environmental document (NPS 1987, NPS 1995).

To protect natural resources and enhance visitor experience (by providing access to scenic views, the river, and winter chain-up areas) perpetuate (keep) 11 pull outs, eliminate 7, and construct 11.

Clean and repair/replace the sewer line. This will be completed under the proposed action or no action.

Utilities would be installed during road construction. This includes the completion of electrical distribution system replacement as adressed in a separate environmental document (NPS 1987, NPS 1995).

3.2.3 12 Ft. Travel Lanes with 2 Ft. Shoulders

Similar to the 11 ft. travel lane alternative described above. The minor differences include constructing: two 12-foot travel lanes, two 2-foot shoulders, a paved 2-foot shy distance between the travel lane and guardwall, and 4 to 1 slope ratio foreslope between the travel lane and fill slopes without guardwall (Figure 3.2).

3.2.4 Alternatives Considered But Not Evaluated

3.2.4.1 National Park Service Standards

The NPS Park Road Standards is a guide for managers, planners, and designers involved in the planning, design, and construction of park roads. The standards were established to accommodate current or planned park road use while continuing to preserve the natural and cultural values of National Park System areas; to address the requirements of Federal Highway Safety Program Standards; and to provide design guidance for projects under the Federal Lands Highways Program for Park Roads and Parkways. For a road such as the El Portal Road with an average daily traffic volume of 1,000 to 4,000 vehicles, the standards suggest minimum roadway cross section requirements of two 11-foot travel lanes with two 3-foot shoulders, a paved surface, and a 40 mph preferred design speed (30 mph minimum) (NPS 1994). However, the standards acknowledge that wide shoulders may be environmentally and aesthetically objectionable, or may encourage undesirable random stopping or parking. Such is the case with El Portal Road where the construction of three-foot shoulders would not be consistent with preserving the natural, cultural, scenic, and recreational values that characterize the park-like feel of the roadway. Thus, 11-foot travel lanes are incorporated the proposed alternative; but since three-foot shoulders are not compatible with the unique features of El Portal Road, an alternative with three-foot shoulders is not evaluated.

3.2.4.2 American Association of State Highway and Transportation Officials Standards

AASHTO standards for design traffic volumes of El Portal Road are two 11-foot travel lanes, a minimum shoulder width of 4 feet (each side of pavement), and a 30 mph minimum design speed (AASHTO 1990). These standards are also not compatible with the project goals of El Portal Road, for the same reasons that the NPS roads standards are not compatible with project goals, and thus this alternative is not evaluated.

3.3 Roadway Attributes

Road attributes (including guardwalls, retaining walls, and drainage structures) would be a part of the proposed action regardless of the design alternative selected. These road attributes contribute to the overall park-like character of the road corridor which will be maintained and preserved. The proposed reconstruction of El Portal Road is a balance among competing interests. The existing roadway and supporting features are nearing the end of their economic life, if not their structural life. This roadway has served the public well for almost 70 years, but is showing signs of failure. This roadway has some endearing features which define its historic park-like character and geometry. Reconstructing the roadway, regardless of width, would require the rebuilding of the road features which have defined its character over the years. The cost of the road features will drive the cost of reconstruction. So, the balance required is to retain the park-like character (and visitor experience) of the roadway while meeting current safety standards for vehicular traffic (including large busses and construction / maintenance vehicles) in a cost effective and environmentally sensitive manner.

To reconstruct the roadway (including road attributes) using existing materials and prior construction methods is not practical and is cost prohibitive. To reconstruct the roadway to modern highway standards is also not practical or cost effective. Modern highway standards would result in unneeded expense, would destroy the historic park-like character of the road, reduce visitor enjoyment, and cause unwarranted impact to the environment. A balanced design would result in a structurally sound roadway which upgrades the long term stability of the road and safety standards (e.g., water runoff, grade rise, hazardous curves, guardwall, and road width) while retaining the park-like character of the road in a cost effective manner. A balanced approach would also maximize the use of the existing road corridor while causing minimum impact to the environment. The selection of attribute alternatives under the proposed action balance these needs and are described in the following sections.

The soil beneath the guardwall completely eroded away in some places.

3.3.1 GUARDWALL

Approximately 25,000 linear feet of guardwall (four and three quarter miles) have been constructed along this 7.5 mile segment of El Portal Road. The guardwall serves numerous functions. It defines the historic geometry of the roadway, contributes to the road's historic character, channels deflected vehicles, provides a sense of security, protects the road users, and stores debris (keeps debris away from the river corridor). The existing guardwall does not serve all these functions, and is thus, considered partially non-functional. Specifically, segments of the wall have structurally failed and none of the wall meets crash test standards. Under the proposed action, all functions of the guardwall must be met; thus, for the most part, the guardwall must be rebuilt. Several alternatives were

The guardwall would be replaced with stone veneer or simulated rock (such as form liner pictured right) that resembles the existing wall and meets safety standards.

evaluated to select the most effective and efficient method to construct the guardwall and meet all functional requirements.

A range of alternatives were evaluated including constructing the guardwall with metal, concrete, rock abutments and wood railings, concrete with stone veneer, and concrete with stone-like material (form liner or shotcrete). Hand laid stone masonry was considered, but not evaluated due to lack of feasibility, extremely high cost, an inability of the end product to meet crash test standards. Based on safety; cost; and natural, cultural, and visual resources; the proposed alternative is to rebuild the guardwalls similar to the existing size and appearance. Acceptable alternatives include stone veneer or simulated rock such as form liner or shotcrete. Simulated rock is being used successfully in several national parks (Freeman 1996). All turn out areas that need guardwalls would be rebuild using a real stone surface. In two turn out areas, the existing guardwall would be retained.

3.3.2 Retaining Walls/Fill Construction

Retaining walls were used extensively in the construction of El Portal Road. The retaining walls along El Portal Road serve several purposes including reducing the required road footprint (provides structural support for the fill material supporting the road), stabilizing areas of cut or fill along the roadway, defining the historic geometry of the roadway, and defining the visitor experience of traveling this roadway. Most existing retaining walls are constructed of dry stack (no mortar) rock walls. Many areas of the retaining walls are showing signs of failure. The exact amount of retaining wall needed for the reconstruction of the roadway depends on the alternative selected and the final road alignment and cross-section design.

It is not the intent of the NPS and FHWA project design team to define all areas of cut, fill, or retaining walls along this entire road segment. This will be left up to the contractor to propose as part of the design. The construction of retaining walls can reduce the extent of required earth cuts or earth fills to achieve stable slopes or to support the roadway. However, to maintain the character of the existing road and to preserve important natural features (such as significant rocks/boulders, large trees, and riparian areas), certain sections of the road will be designated for “cut only” or “fill only.” Similarly, to ensure retaining walls meet all the specified functions (particularly for park-like road geometry and visitor experience), various alternatives for retaining wall construction that meet all required functions were evaluated. Acceptable alternatives include stone veneer or simulated rock such as form liner or shotcrete.

3.3.3 *DRAINAGE STRUCTURES*

Drainage features for the roadway include roadside conveyance (ditch), inlets, and outlets. Each of these features serves specific purposes. Ditches serve to channel water (runoff), channel sediment, store rock / snow (removed from the road surface during maintenance operations until disposed of), define road geometry, define historical geometry, and define the road boundary. Inlets serve to funnel water, remove water, trap sediments, convey sediments, and provide structural entrance to the drainage pipe / conduit. Outlets serve to discharge water, dissipate energy (of flowing water), control erosion, and provide a stable exit for the drainage pipe / conduit; ideally, outlets are self cleaning.

Alternatives for ditches include a paved ditch with curb, paved swale (similar to existing), rock lined ditch, or coarse soil shoulder (existing). Alternatives for inlets include drop inlets, mortared rock lined basin with headwall, rock lined basin with headwall (existing), or riser type drop inlet. Outlets are natural rock / vegetation, ungrouted rip rap (randomly placed rock), or grouted rip rap.

Existing curbside conveyance (ditches) are either paved swales or coarse soil shoulder. The inlets are predominantly a rock lined basin with a stone masonry headwall. Outlets include all three alternatives depending on site conditions. The existing drainage structures will be maintained where feasible or new structures, similar in materials and appearance, would be reconstructed. Outlets will continue to vary dependent on outflow conditions; natural soil / vegetation where flows are small, ungrouted rip rap where needed to prevent soil erosion from larger flows, and grouted rip rap where needed to prevent erosion or displacement of rock. Soil or

The three culverts west of Cascades Creek Bridge are no longer adequate to handle flow volumes associated with this dynamic watershed area.

ungrouted rip rap will be the preferred alternative to support natural vegetation / revegetation of disturbed areas.

3.3.4 Cascade Creek Drainage

The existing roadway crossing of Cascade Creek currently occurs at two locations. Upstream of the roadway the stream channel divides with a portion of the flow passing beneath the Cascade Bridge and the remaining portion passing through three 84 inch diameter corrugated metal culverts which exist approximately 400 feet to the west of the bridge. Prior to the flooding, the hydrology of the stream was such that the majority of the flow passed under the bridge and the culverts existed only to handle high flow. Channel changes resulting from the flood altered the stream hydrology so that now approximately half the normal flow occurs through the culverts. Without additional flow capacity at the culvert crossing, upstream flooding can be expected during future high flow events.

Two basic solutions to this problem are (1) to modify the upstream channel to redirect stream flow under the bridge or (2) to increase the flow capacity of the culvert crossing. Attempts to redirect the stream would not provide a permanent solution since there is a high potential for the stream channel to revert to present flows. The impacts associated with upstream channel modification would also be detrimental to existing park resources. Therefore, the proposed alternative is to increase the flow capacity of the culvert crossing. Several alternatives were evaluated including adding a fourth culvert or replacing the existing culverts with a three-sided reinforced concrete box and natural bottom, a pipe arch and natural bottom, or a standard box culvert. Based on feasibility, maintenance, cost, natural and visual resources, and visitor experience factors, the proposed alternative is to replace the existing culverts with two 12-foot by 8-foot reinforced concrete box culvert cells.

3.3.5 Entrance Station Relocation

The two-lane western entrance to Yosemite National Park on State Highway 140 funnels daily average traffic of 2,950 vehicles through the Arch Rock Entrance Station during the peak season. Numerous buses arriving at the entrance frequently cause severe congestion on the western approaches to the station during the peak season. The station is the first point of contact the visitor has with the park and it is the first opportunity to pay the entrance fees and obtain maps and information. With the exception of certain vehicles which carry daily park passes visible to the entrance station ranger, vehicles are required to stop at the station before entering the park. Frequently, instances occur where extended discussions with the ranger are necessary to respond to questions regarding various aspects of a visitor’s agenda or needs. The grade of El Portal Road west of the entrance station ranges from 2.5 to 7 percent, which is not conducive for stopping while waiting to pay entrance fees. In some cases, it is necessary for automobiles, RVs, or buses to park in the limited parking facilities near Arch Rock. Arch Rock has limited shoulder parking which can safely accommodate fewer than four vehicles, or less when buses are present. Only eight parking spaces are available on the parking lot next to Arch Rock immediately east of the entrance station. This area also contains a rest room facility and an interpretive sign.

Relocation of the entrance station is part of the proposed action. This would provide a larger entrance area for fee collection (three booths) , eliminate congestion and long wait periods, and facilitate regional transportation by improving bus entrance. The entrance station relocation would be accomplished by acquiring private land located south of Highway 140 immediately adjacent to the park boundary (Parkline). The exchange agreement with the landowner would provide for the design and construction of a parking lot, entrance station, and sewer connections adequate to accommodate existing and future park and private landowner needs. The acquired property would become part of the Yosemite administration land holdings and would not be physically located within the park boundaries.

The land exchange would be accomplished pursuant to NPS guidelines currently in effect (as revised February 16, 1995). These guidelines require the non-federal party to an exchange to convey title to the U.S. in accordance with the Standards for the Preparation of Title Evidence in Land Acquisitions by the U.S. (Department of Justice, 1970). The exchange guidelines provide for public notice and comment prior to the exchange of title.

3.4 Related Activities

Activities related to the implementation of the proposed action are considered in this EA and described below.

3.4.1 Design Build Construction

The design / build (D / B) method of project development was prevalent in this country at the turn of the century. Through the years, the process of construction infrastructure evolved to the current design-bid-build system; however, D / B construction is recently being re-introduced into transportation projects. This system shortens the current sequential process by commencing construction prior to design completion. It has been used successfully by private industry and the government. The reconstruction of El Portal Road would the first D / B roadway project within the National Park System although Yosemite has used it recently working with concessioners.

Under the D/B process, the contractor develops a critical path schedule for the project. This schedule integrates the tasks using the time available and reflects all necessary activities, including design, utilities, construction, mitigation, and all other tasks necessary to complete the project. The contractor must balance resources - including manpower, equipment, and material - and is required to furnish a maximum payout curve for the project based on the schedule. Changes during the D/B process can have major ramifications to the critical path of the project and may upset the contractor's planned balance of resources resulting in longer construction duration and higher than anticipated costs.

To ensure the project is completed within the prescribed timeframe and budget constraints, the D/B contract defines the roles and responsibilities of the contractor and the NPS. This is currently under development and includes a preliminary design which sets the basic configuration of the project, including alignment and typical cross sections. The D/B contract would include all of the activities described in Section 3.2.2, except for the addition of rest room facilities, the relocation of the entrance station, the completion of utility work, and the repair/replacement of the sewer line. The NPS would have assurances that the design of the project meets the parameters set forth in the contract documents. This EA is one of those binding contract documents. The contractor is required to submit a design and construction quality assurance and control plan to ensure that all design and construction documents are prepared in accordance with good, prudent, and accepted design and engineering practice, and meet all requirements of the contract documents. Construction requirements and activities would be completed in accordance with Federal Lands Highway specifications.

3.4.2 Road Access During Construction

During the reconstruction of El Portal Road, non-construction related vehicular access to the Valley via El Portal Road would need to be restricted. Numerous access options for non-construction vehicles have been considered by the NPS and discussed with stakeholders. Options were developed and evaluated based on their ability to accommodate stakeholders including park visitors, local communities and businesses, school district, park and concession employees, NPS management, FHWA, taxpayers, and construction workers. These options ranged from complete access in some months to no access in other months. One option included bus access into and out of Yosemite Valley. The access plan needs to provide flexibility for the contractor to minimize construction costs and road closures during different construction activities or phases.

The access plan developed would provide unlimited access from the beginning of Memorial Day Weekend through the end of Labor Day Weekend. (During the summer season, there would be no construction activity and the road would be open 24 hours a day.) Limited access would be provided for the remainder of the year. Access hours would include 6:30 AM to 8:30 AM, 4:30 PM to 7:30 PM, and 11:30 PM to 12:30 AM. This would be minimum non-construction related access provided. Depending on the contractor's work schedule, beyond these minimum access periods, if additional access periods are feasible, they may be added. In the event that the contractor does not work seven days per week, Saturday access would be the first priority for more public access.

During construction it is not practical to expect more than one lane of travel to be available during periods of access. The preparation of the roadway base and the reconstruction of the guardwall would restrict the available travel lanes to one lane. Therefore, in most construction areas only one direction of travel can occur at a time. All non-construction related access would be provided using flaggers or a convoy with two pilot vehicles to control travel speeds and maintain a safe construction zone. Also, there may be short periods of time that the roadway would be closed and no access would be allowed to non-construction related vehicles. These periods would be rare and would be as short as possible.

3.4.3 CONSTRUCTION STAGING AREAS

Five sites around El Portal are being evaluating for construction staging areas. These sites include: CalTrans turn out near Parkline (an eighth of an acre), the area behind the El Portal post office (half an acre suitable for office trailers), El Portal sand pit (over two acres suitable for a crushing and / or concrete batch plant), old El Portal firing range (about one acre), and two small (tenth of an acre) sites by the Barium Mine Road. All of these sites are can be easily accessed by construction vehicles. The sites can be used year round with the exception of part of the El Portal sand pit which is associated with the 100-year flood plain. The use of these areas would provide substantial time and cost savings. All sites would be restored after use.

Table 3.2 Comparative Analysis of Alternatives

	No Action	11 FT. Travel Lanes (Proposed Action)	12 FT. Travel Lanes w/ 2 FT. Shoulders
NATURAL RESOURCES			
Geology and Soils	Continue maintenance of existing roadway. Some unstable slopes. Safety and maintenance problems from flood damaged road base and existing slumping and erosion of cut and fill slope areas.	Long-term disturbance of approximately five acres of surface soils from expanded road footprint. Additional soil loss from expanding existing cuts into decomposed rock/soil and enlarging existing rock/soil fills. Improved drainage and slope stability. Easier maintenance.	Long-term disturbance of approximately 11 acres of surface soils from expanded road footprint. Additional soil loss from expanding existing cuts into decomposed rock/soil and enlarging existing rock/soil fills. Improved drainage and slope stability. Easier maintenance.
Hydrology and Water Resources	Minor erosion to bare or sloughing road banks would continue. Moderate to major erosion during flood events would continue to weaken road bed.	Additional limited encroachment on river from fill slope activity and construction of road stabilization structures. Improved drainage. Reduced risk of road damage from future flood events.	Additional limited encroachment on river from fill slope activity and construction of road stabilization structures. Improved drainage. Reduced risk of road damage from future flood events.
Air Quality	No impact	Temporary increases in fugitive dust from construction activities.	Temporary increases in fugitive dust from construction activities.
Noise	No impact	Temporary disturbance to wildlife from construction activity.	Temporary disturbance to wildlife from construction activity.
Vegetation	No impact	Long-term disturbance of approximately five acres of roadside vegetation from expanded road footprint. Temporary roadside vegetation displacement from expanding existing cuts into decomposed rock/soil and enlarging existing rock/soil fills.	Long-term disturbance of approximately 11 acres of roadside vegetation from expanded road footprint. Temporary roadside vegetation displacement from expanding existing cuts into decomposed rock/soil and enlarging existing rock/soil fills.
Wildlife	No impact	Temporary loss of den and nest habitats on rock slopes. Possible indirect mortality from construction activities.	Temporary loss of den and nest habitats on rock slopes. Possible indirect mortality from construction activities.

Sensitive Species	No impact	Relocation of most Tompkin's sedge plants found in project area. Biological Assessment underway to determine possible location of additional sensitive species within the project area and to develop mitigation measures to avoid any potentially significant impacts.	Relocation of most Tompkin's sedge plants found in project area. Biological Assessment underway to determine possible location of additional sensitive species within the project area and to develop mitigation measures to avoid any potentially significant impacts.
CULTURAL RESOURCES	Continued deterioration of historic features and fabric of site Y97B-1, El Portal Road, would continue.	Direct impacts to historical features of site Y97B-1, El Portal Road. Potential impacts to subsurface resources within project area.	Direct impacts to historical features of site Y97B-1, El Portal Road. Potential impacts to subsurface resources within project area.
VISITOR AND PARK USE			
Land Use	No impact	Positive impacts from entrance station relocation and additional rest room facilities.	Positive impacts from entrance station relocation and additional rest room facilities..
Utilities	No impact	Positive impact if telephone lines are placed underground.	Positive impact if telephone lines are placed underground.
Transportation	Existing roadway unsafe for vehicles, especially large vehicles including busses which will eventually be used to facilitate regional transportation.	Positive impact to traffic safety from improved geometry and lateral clearance of the roadway and Big Oak Flat intersection. Temporary restricted road access during construction periods (i.e., fall, winter, and spring) from Labor Day through Memorial Day Weekends.	Positive impact to traffic safety from improved geometry and lateral clearance of the roadway and Big Oak Flat intersection. Temporary restricted road access during construction periods (i.e., fall, winter, and spring) from Labor Day through Memorial Day Weekends.
Visual Resources	No impact	Minor visual change in scenic nature of roadway. Temporary vegetation and canopy losses along roadway.	Minor visual change in scenic nature of roadway. Temporary vegetation and canopy losses along roadway.
Socio-economic	Park and surrounding community subject to losses in revenue due to road closures from future flood events.	Positive impacts to community from construction moneys spent in area. Adverse impacts to tourists and residents due to restricted road access.	Positive impacts to community from construction moneys spent in area. Adverse impacts to tourists and residents due to restricted road access.

4.0 Affected Environment

Detailed information on natural and cultural resources in Yosemite NP may be found in the 1978 draft EIS-GMP and the 1980 Final Environmental Impact Statement of the Yosemite General Management Plan (FEIS-GMP). A summary of the natural and cultural resources associated with the project follows.

4.1 Natural Resources

4.1.1 Geology and Soils

4.1.1.1 Geology

Yosemite is located on the western slope of the central Sierra Nevada Mountains in California. The park consists of approximately 761,000 acres with elevations ranging from 2,000 feet on the western edge of the park to over 13,000 feet at the central crest. The region has been subject to many geologic influences including significant volcanic activity, granitic intrusion, uplifting and tilting, and glacial episodes.

Yosemite National Park holds the largest glacially carved valley within the Sierra Nevada. As many as ten glaciations are thought to have advanced and retreated through Yosemite Valley. Glaciers widened and deepened valley bottoms and formed the characteristic U-shaped valleys and features such as alpine peaks, hanging valleys, meadows, steep glaciated horns, and moraines (Huber 1989).

The present features of the Merced River Canyon largely reflect the last glaciation, the Tioga. The Tioga glaciation left the landscape scoured with a small basin filled with silt and sedimentation (NPS 1994). Scientists believe that the rocks and boulder debris deposited by the final Tioga glacier dammed the Merced River at Yosemite Valley’s west end, forming Lake Yosemite. Eventually, the lake filled in with silt washed down from the High Sierra, and the dry, flat Yosemite Valley floor was created. The terminal moraine of the Tioga glacier is found on the eastern end of Merced River Canyon. This moraine left considerable amounts of granitic and soils deposition along the western sides of the canyon. These deposits are largely responsible for the variation in soil composition and occurrence throughout the river canyon.

Significant incision from streams flowing into the valley have created the present river courses throughout the Sierra. Two major river canyons, the Merced and the Tuolumne, incise the park from east to west. Side drainages generally run north or south into both rivers (van Wagtendonk 1985). The segment of the Merced River between Pohono Bridge and the park boundary (Parkline) has a change in gradient of over 2,000 feet.

Several landslide events have occurred along El Portal Road. These events have been documented (Wieczorek et al. 1992) and provide a reference for historic rockslide hazards along the Merced River Canyon and areas where grade instabilities exist and are known to pose potential risk for future rockfall events.

4.1.1.2 Soils

Soils in Merced River Canyon are derived from the deposition of sedimentation from the glacial processes and the decomposition of granitic bedrock. In some areas, alluvial deposits have accumulated to a depth of more than 1,900 feet. In other eastern areas of higher elevation, soil depth can be as shallow as one to five feet. These high country soils tend to be glacial or residual with a one to three foot layer of top soil from the abundance of plants and associated decomposition.

Forest soils in the Sierra Nevada have been classified in the Inceptisol order while meadows are classified in the Entisol or Histosol orders (Wood 1975). More than 50 soils have been identified throughout the park, differentiated primarily from the effects of topography, surface runoffs, groundwater, and the distribution of stony soils. Detailed soils maps have been prepared for the El Portal area.

4.1.2 Hydrology and Water Resources

Two major watersheds divide Yosemite: the Tuolumne and the Merced. The Tuolumne River originates at the Mount Lyell glacier and drains the entire northern portion of the park. The Merced watershed begins in the park's southern peaks, primarily in the Clark and Cathedral Ranges, and drains westward through the Merced River Canyon. Overall, the park contains over 1,667 miles of rivers and streams. Rain and snow provide the main source of water for these watersheds.

The park contains approximately 1,591 lakes which are at least 0.018 acres in size. Of these, 526 lakes are greater than 1 acre (NPS 1996). These lakes are located primarily within the subalpine and alpine zones, in the upper canyons and glacial remnants below mountain peaks.

The Merced River gauging station is located at the Happy Isles Bridge. Discharge measurements have been recorded since 1915 with water quality surveys checked since 1968. Average annual precipitation in Yosemite Valley is 36.5 inches (NPS 1996). Between October and April, snow accounts for approximately 95 percent of precipitation. Merced River flows from snowmelt with peak flows in May and June and minimum flows generally recorded in September and October.

4.1.2.1 Water Quality

Water quality within the park is generally better than state and federal standards require (NPS 1994). The surface water quality of most park waters are considered by the California Water Resources Control Board as beneficial for wildlife habitat, cold freshwater habitat, noncontact recreation, canoeing and rafting, and water contact recreation (NPS 1994).

4.1.3 Air Quality

Yosemite is classified as a mandatory Class I area under the Federal Clean Air Act (42 U.S.C. 7401 et seq.). This air quality classification is aimed at protecting park and wilderness area values such as visibility, plants, animals, soils, water quality, cultural and historic structures and objects, and visitor health from adverse air pollution impacts (NPS 1997). Federal ambient air quality primary and secondary standards are provided by the National Ambient Air Quality Standards (NAAQS), as established by the U.S. Environmental Protection Agency (EPA) (Clean Air Act, 42 U.S.C. 7470, et seq., as amended). California Ambient Air Quality Standards (CAAQS) are promulgated by the California Air Resources Board (CARB).

4.1.3.1 Air Quality Conditions

Air quality in the Merced River Canyon is affected by both internal air pollution sources and transported air pollution from stationary and mobile sources outside park boundaries. Internal air pollution sources include mobile source emissions, combustion by-products, campfires, wood stoves, prescribed fires, and temporary fugitive dust from construction projects.

With the exception of occasional exceedance of state standards for ozone and PM_{10}, air quality in the vicinity of Merced River Canyon is good. Smog from nearby urbanized areas exists in Yosemite but the area's conditions are generally not conducive to the buildup of pollutant concentrations. Adverse air emissions tend to disperse daily. Typical major sources of pollution such as heavy industry and fossil fuel power plants are not present in the area.

4.1.3.2 Climate

The climate in Yosemite is affected by geographical influences such as the temperate latitude, the distance from the Pacific Ocean (from which the prevailing winds send moisture-laden clouds), and the steep topography that tends to raise the clouds and cause precipitation on the western side of the Sierra Nevada. Climate determines the growing season and water balance of plant communities.

Summers in Yosemite tend to be hot and dry, and winters are cool and moist. Average temperatures range from 25°F to 120°F near El Portal between 2,000 and 3,000 feet in elevation, from 25°F to 89°F at 4,000 feet, and from 15°F to 70°F at 8,600 feet. Annual precipitation varies from about 37 inches at 4,000 feet to about 50 inches at 8,700 feet. Typical snow depths in the high country in April range from 8 to 10 feet, but may reach 20 feet.

The seasonal pattern for precipitation and high temperatures is highly variable. The majority of rain and snow falls between October and April, leaving a relative drought period during the hottest part of the year. Drought and high temperatures associated with this Mediterranean climate can aid the spread of fire.

Torrential winter rain falling on a snow-laden high country accounts for periodic flooding of the Merced and Tuolumne Rivers. There has been significant flooding at the middle and low elevations ten times in the last 100 years, and a major flood in January 1997. The largest floods were in 1937, 1950, 1955, and 1997, and they are estimated to have reached flood height equal to a 50-year flood event (NPS 1990 in NPS 1996), with the exception of the 1997 flood which is estimated to have reached a flood height equal to a 100-year flood event (Jackson et al. 1997).

4.1.4 NOISE

Natural sources of sound in the Merced River Canyon include waterfalls, rushing water, wind, and wildlife. Ambient noise levels around the canyon are commonly in the 60 to 65 A-weighted decibel (dBA) range (NPS 1996). Rushing water is the primary source of ambient sound and can range up to 80 dBA in some parts of the canyon. During the periods of highest visitation, Memorial Day to August, background noise levels decrease correspondingly with decreasing amount of falling and rushing water.

Human noise is heard throughout Merced River Canyon and is caused by human activities and mechanical devices such as automobiles, trucks, buses, motor homes, and generators. Two studies (Aeroenvironment Inc. 1973; Mitchel and English 1996) found that natural and human sources of noise appear to be of equal magnitude with the exception of areas near roads, lodging areas, and campgrounds.

4.1.5 VEGETATION

El Portal Road between the park boundary (Parkline) and Pohono Bridge climbs over 2,000 feet in 7.5 miles from an elevation of approximately 2,000 feet (NPS 1980). The vegetative composition of the Merced River Canyon is influenced by water availability, fire history, geologic substratum, elevation, climate, and topography. In general, the Merced River Canyon is lined with a narrow band of riparian vegetation along the river course bordered by chaparral and foothill woodland communities on the steep canyon walls which give way to conifers at higher elevations (van Wagtendonk 1985). The riparian areas and lower elevation meadows are the most biologically productive communities in the park. In addition to riparian areas, the Merced River Canyon supports some of the most exceptional stands of California black oaks for the Sierra Nevada and is noted for the frequent occurrence of California nutmeg, an unusual conifer. Vegetation communities found within the Merced River Canyon can be divided into general classifications or zones, based on species composition. These include wetland communities, Chaparral, Foothill Woodland, and Mixed Conifer Forest. The Merced River Canyon contains approximately 50 percent of all plant species found in the park, which is known to contain as many as 1,374 vascular plant species along with numerous ferns, bryophytes, and lichens.

4.1.5.1 Wetland Communities

Wetland communities in the Merced River Canyon fall into two main categories: 1) the riparian zone along the edges of the main river channel and its tributaries and 2) the self-contained systems such as ephemeral ponds, oxbows, and cut-off channels (NPS 1996). These areas are considered wetlands because they possess hydric soils, hydrophytic vegetation, and wetland hydrology. These communities play vital roles in the Merced River Canyon ecosystem, including enhancing biological productivity, providing specialized habitat, and incorporating certain inorganic nutrients into the food chain.

Vegetation in the riparian community is characterized by broadleaf deciduous trees such as white alder, black cottonwood, and willow. Riparian communities within Yosemite sustain higher levels of disturbance than other vegetative communities. In addition to natural perturbations caused by periodic flooding, the riparian zones are subject to additional disturbance as a direct result of the river's popularity for visitors and the subsequent trampling or use. The NPS has initiated a restoration program designed to protect fragile riparian riverbanks from erosion. Visitor use is directed to riverine areas such as sandbars that can accommodate more visitor impact.

4.1.5.2 Chaparral/Foothill Woodland Zone

Outside the riparian corridors, the lowest elevation plant communities in the Merced River Canyon are primarily scrub and chaparral types. Chaparral grows on drier sites interwoven with other communities or in broad expanses covering entire hillsides. The chaparral zone ranges up to about 6,500 feet and occupies approximately 1.7 percent of the entire park (NPS 1996). Chaparral is dominated by woody evergreen shrubs such as chamise, manzanita, ceanothus, and mountain mahogany. The chaparral community is interdigitated with foothill woodlands dominated by interior live oak, canyon live oak, and grey pines (van Wagtendonk 1986).

Although the two communities can be found together, foothill woodlands tend to occupy deeper soils, moister exposures, and slightly higher elevations than chaparral. The dominant trees include California black oak, blue oak, canyon live oak, interior live oak, California bay-laurel, California buckeye, and grey pine. Understories can consist of grasses, shrubs, or bare ground covered with leaf litter. California nutmeg, an unusual conifer otherwise infrequent in the Sierra Nevada, is relatively abundant along the road corridor in the foothill woodlands and lower coniferous forest zones.

4.1.5.3 Mixed Conifer Forest Zone

As precipitation and elevation increase above the chaparral and foothill woodland, ponderosa pines begin to dominate, along with incense cedar, douglas-fir, and white fir. The mixed conifer zone covers approximately 25 percent of the park, primarily between 4,900 feet and 9,840 feet in elevation (NPS 1996).

Mid-elevation forests along the Merced River Canyon include a broad range of conifer species with ponderosa pine dominant at the lower end of the zone. Incense cedar, Douglas-fir, sugar pine, and white firs occupy slightly higher zones. These species extend downward into the chaparral and foothill woodland belt on the lower slopes and flats along the Merced and other major rivers. The downward extension of coniferous forest species into the foothill belt along the river course is fostered by cooler and moister microclimatic conditions caused by cold air drainage from higher elevations and proximity to the river.

Broad-leafed trees are also important members of the community and include California black oak and mountain dogwood. Understories vary from dense shrub layers to open grasslands.

4.1.6 Wildlife

Yosemite contains habitat for 84 mammal, 224 bird, 33 reptile and amphibian, 7 fish, and numerous invertebrate species (NPS 1996). The three major vegetation zones within the Merced River Canyon support a varied subset of these wildlife species. The more mobile wildlife species within the canyon often cross vegetation zone boundaries, but general statements can describe the normal distribution of species within elevation ranges and major vegetation types.

4.1.6.1 Mammals

Approximately 84 species of mammals are known to exist or have been recorded in Yosemite (NPS 1996). Among the largest and most commonly seen are mule deer and black bears. Mule deer in Yosemite move from higher to lower elevations during the fall and reverse in the spring. The present population is estimated at about 9,000.

Black bears are frequently encountered above 9,000 feet and the current population is estimated between 500 and 750 individuals (NPS 1996). The rocky canyon walls and proximity to water provide ideal habitat for ringtail, a seldom-seen nocturnal predator of small mammals and birds. Other typical mammals found within the project area include coyote, raccoon, cottontail rabbits, woodrats, and a variety of mice, squirrels, and chipmunks.

4.1.6.2 Birds

Approximately 224 species of birds have been recorded in the Yosemite region, 36 of which are infrequently recorded. Most all bird species begin to migrate south in late summer and spend the winter in warmer climates or at lower elevations. Commonly observed birds include hawks, owls, woodpeckers, warblers, and hummingbirds (NPS 1996). Birds found within the project area include species typical of chaparral, foothill woodland, lower coniferous forest, and riparian habitats.

4.1.6.3 Reptiles and Amphibians

Approximately 33 species of reptiles and amphibians have been recorded in the Yosemite region. This includes 14 snakes, 7 lizards, 1 turtle, 2 toads, 1 tree frog, 3 frogs, and 5 salamanders (NPS 1996). This variety of species may be partly due to the milder climate of the western slopes of the Sierra. The only poisonous species is the western rattlesnake.

4.1.6.4 Fish

Seven fish species are currently known to exist or have been recently recorded within the Merced River Canyon. These species include the Sacramento squawfish, Sacramento sucker, golden trout, cutthroat trout, rainbow trout, brown trout, and the Arctic grayling (NPS 1996). Under natural conditions, fish are absent from lakes and streams in Yosemite above 4,000 feet; native fish stocks occur naturally only at elevations below 4,000 feet. Most fish in Yosemite lakes, rivers, and streams were introduced by humans. Recreational fish stocking by the California Department of Fish and Game was terminated in 1991. Surveys indicated that 161 of 319 lakes had been stocked, and approximately 115 are expected to maintain populations without further stocking (NPS 1994).

Climatic conditions, low fertility associated with snow melt and granitic watersheds, a lack of spawning habitat, and highwater events have contributed to the absence of native fish in a majority of the park’s lakes and streams. Native rainbow trout populations, which occurred only in the Merced and Tuolumne Rivers, have since disappeared due to competition with non-native fish in these river segments.

4.1.6.5 *Invertebrates*

Limited information is available on invertebrates within Yosemite. Two endemic species of snails have been reported in the upper end of Yosemite Valley. They were collected from rockslides near Vernal Falls and Camp Curry. No information is currently available on invertebrates within the Merced River Canyon.

4.1.6.6 *Exotic Species*

Non-native wildlife know to have been transplanted into Yosemite include several species of trout, white-tailed ptarmigan, and the bullfrog. Two other exotic species, feral pigs and wild turkey have been recorded in recent times along park boundaries and could establish ranges in the park ecosystem. No exotic species are known to exist within the Merced River Canyon.

4.1.7 *Sensitive Species*

Sensitive species identified as potentially occurring in the project area along with their status and a summary of their distribution with respect to the project area are described in Table 4.1. The species contained in this table were compiled from a variety of sources. A list of 50 sensitive species which may be present in or may be affected by projects in Yosemite National Park was provided to the park by the U.S. Fish and Wildlife Service (USFWS) on January 15, 1997. In meetings held on March 13, 1997, with Steve Thompson, Yosemite wildlife biologist; Lisa Nemzer Acree, Yosemite resource management botanist; and Jan van Wagtendonk Ph.D., USGS Biological Resources Division Yosemite Field Station, additional species of concern that may experience some direct or indirect impacts were added to the list. The list was further refined in discussions with Steve Thompson; Jan van Wagtendonk; and Sue Fritzke, Yosemite plant ecologist on April 23, 1997.

Federally listed threatened or endangered species include two birds known to occur in the project area, the southern bald eagle and the peregrine falcon. The bald eagle is a seasonal transient in the Merced River Canyon. The peregrine falcon has three active nests in Yosemite Valley and one nest site near the Cascades in the project area that has not been occupied during the last two years. One federally listed threatened fish, the Paiute cutthroat trout, has been introduced into the Merced River Canyon area and may persist. The California red-legged frog is known historically in lower elevations of the Merced River drainage, but is believed to be extirpated from the area. The elder-berry longhorn beetle, known from the Central Valley, is not expected to range into the project area although its host plant does reach project area elevations.

Yosemite staff conducted surveys for sensitive plant species that might occur along the road corridor and identified more than four hundred individuals of Tompkin's sedge

(*Carex tompkinsii*) within 50 feet of the existing road 90 percent of which were on the uphill side of the road (Cunningham-Summerfield 1997). Although the park has identified an additional 49 plants that are rare and sensitive locally (NPS 1996), no additional sensitive plant species were found during surveys of the corridor.

Table 4.1 Sensitive Species Potentially Occurring in the Project Area

Species	Status: Federal	Status: State	Occurrence/Habitat Preference
Federally Listed Species			
American peregrine falcon (*Falco peregrinus*)	E	E	Forages over rivers, lakes, and streams; nests on high cliffs over water. Breeding recorded near the Cascades in the Merced River Canyon Project Area. Three active nest sites in Yosemite Valley.
Bald eagle (*Haliaeetus leucocephalus*)	E	E	Forages over streams, rivers, and lakes. Transient in Yosemite Valley and Merced River canyons. No known nests in Yosemite Valley.
California red-legged frog (*Rana aurora draytonii*)	T	CSC	Found in quiet pools in permanent streams including the Merced River below the project area. Believed to be extirpated from the project region.
Paiute cutthroat trout (*Oncorhynchus clarki seleniris*)	T		Previously introduced to the Merced River Canyon. Current status in the project area unknown. Native to drainage, the east slope of the Sierra
Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)	T		Found on elderberry in Central Valley. Not expected to occur in project area.
State Listed Species			
Great gray owl (*Strix nebulosa*)		E	Breeds in mixed conifer/red fir forests bordering meadows. Breeding habitat not present in project area. May fly over site. Species known to occur in Yosemite Valley.
Willow flycatcher (*Empidonax trailii*)		E	Breeds in willow thickets with dense understory near open meadows and water. No recent breeding records in Yosemite Valley.
Special Status Species			
Fringed myotis bat (*Myotis thysanodes*)	FSC		Found in oak-piñon and coniferous forests. Roosts in caves, rock crevices, and buildings. Occurrence in project area unknown.
Long-eared myotis bat (*Myotis evotis*)	FSC		Occurs in coniferous forests of high mountains. Roosts in caves and buildings. Occurrence in project area unknown.

Table 4.1 Sensitive Species Potentially Occurring in the Project Area (Continued)

Species	STATUS *Federal*	*State*	*Occurrence/Habitat Preference*
Special Status Species (Continued)			
Long-legged myotis bat (*Myotis volans*)	FSC		Typically associated with montane forests and riparian habitats. Roosts in rock crevices in cliffs, cracks in ground, and behind loose bark on trees. Occurrence in project area is unknown.
Small-footed myotis bat (*Myotis ciliolabrum*)	FSC		Most common in arid environments. Roosts in caves, buildings, mines, or crevices. Occurrence in project area unknown.
Yuma myotis bat (*Myotis yumarensis*)	FSC		Found in areas with trees adjacent to open water. Roosts in caves, tunnels, and buildings. Occurrence in project area unknown.
Greater western mastiff bat (*Eumops perotis*)	FSC	CSC	Habitat includes vertical cliffs and crevices. Documented in Yosemite Valley in 1993.
Pallid bat (*Antrozons pallidus*)		CSC	Forages in wide variety of habitats. Feeds on ground-dwelling arthropods. Roosts in trees, caves, and tunnels. Occurrence in project area unknown.
Spotted bat (*Enderma maculatum*)	FSC	CSC	Occurs in mountain coniferous forest. Roosts in cliffs, caves, and crevices. Confirmed siting in Yosemite Valley.
Townsend's big-eared bat (*Plecotus townsendii*)	FSC	CSC	Found in variety of habitats. Roosts in caves, mines, and buildings. Occurrence in project area unknown.
Pacific fisher (*Martes pennanti pacifica*)	FSC	CSC	Inhabits conifer and mixed conifer/deciduous forests. Has been observed in Yosemite Valley.
Cooper's hawk (*Accipiter cooperi*)		CSC	Forages through open and semi-open woodland. Breeds in oak woodland and riparian habitats. Resident breeder in project area.
Northern goshawk (*Accipiter gentilis*)	FSC	CSC	Nests in coniferous forests. Unlikely in project area (generally occurs at higher elevations).
Sharp-shinned hawk (*Accipiter striatus*)		CSC	Nests in forested areas. Hunts in open and semi-open forests and meadows. One record (1930) of nesting in Yosemite Valley.

Table 4.1 Sensitive Species Potentially Occurring in the Project Area (Continued)

Species	Status: Federal	Status: State	Occurrence/Habitat Preference
Special Status Species (Continued)			
Mountain quail (*Oreortyx pictus*)	FSC?		Found in open cleared areas in montane coniferous forest.
California spotted owl (*Strix occidentalis*)	FSC	CSC	Breeds in old-growth mixed conifer and oak woodland. Several pairs nesting within a few miles of project area.
Long-eared owl (*Asio otus*)		CSC	Nests in riparian and oak/conifer forests. One old record (1915) of nesting in Yosemite Valley.
Harlequin duck (*Histrionicus histrionicus*)	FSC	CSC	Breeds in forests adjacent to swift-moving streams. Forages in rivers and streams. Observed near Wawona and in Yosemite Valley.
Northern sagebrush lizard (*Sceloporus graciosus*)	FSC		Inhabits mountain slopes, forested slopes, and open areas. Occurs in sandy open areas near water. Occurrence in project area unknown.
Western pond turtle (*Clemmys marmorata*)	FSC	CSC	Prefers quiet waters of ponds, small lakes, and slow-moving streams. Observed at El Portal in 1995.
Foothills yellow-legged frog (*Rana boylii*)	FSC	CSC	Found in permanent streams and mountain meadows up to elevations of 6,000 feet. Believed to be extirpated from project area.
Bohart's blue butterfly (*Philotiella speciosa bohartorum*)	FSC		Suspected host plant for this species unlikely to be present in project area.
Keeled side-band snail (*Monadenia circumcarinata*)	FSC		Occurrence in project area unknown.
Yosemite mariposa side-band snail (*Monadenia hillebrandi yosemitensis*)	FSC		Occurs in rockslide habitat with shade and moisture. Reported in Yosemite Valley in 1939.
Merced Canyon shoulder-band snail (*Helminthoglypta allynsmithi*)	FSC		Found in rockslide habitat with shade and moisture. Recorded in Merced Canyon.

Table 4.1 Sensitive Species Potentially Occurring in the Project Area (Continued)

	STATUS		
Species	*Federal*	*State*	*Occurrence/Habitat Preference*
Special Status Species (Continued)			
Wawona riffle beetle (*Atractelmis wawona*)	FSC		Aquatic adult and larval forms. Occurs in rapidly flowing streams. Recorded in Merced River in Yosemite Valley.
Sierra pygmy grasshopper (*Tetrix sierrana*)	FSC		One record for El Portal in 1953, second record from Madera County.
Tompkin's sedge (*Carex tompkinsii*)		R	Occurs around oaks and boulders. Over 400 individual plants observed in project area.

The following 24 species from the USFWS list were identified by Thompson, Acree, and / or van Wagtendonk as not occurring in or near the Merced River Canyon between the park boundary (Parkline) and Pohono Bridge (Table 4.2).

Table 4.2 Species Not Occurring in the Merced River Canyon between park boundary (Parkline) and the Pohono Bridge

Lahontan cutthrat trout	mountain yellow-legged frog	Sierra Nevada snowshoe hare
delta smelt	longfin smelt	Bell's sage sparrow
Sacramento split tail	Mono Hot Springs evening-primrose	Mount Lyell salamander
Mono Basin mountain beaver	Yosemite woolly sunflower	limestone salamander
Sierra Nevada red fox		Red Hills roach
pygmy rabbit	Central Valley steelhead	Hetch Hetchy monkey flower
ferruginous hawk	California wolverine	Tiehm's rock-cress
Yosemite toad	Mount Lyell shrew	parasol clover

4.2 Cultural Resources

4.2.1 Introduction

Subsequent to the Merced River flooding in January 1997, NPS archeologists conducted preliminary historical documentation, on sight surveys, and documentation of the El Portal Road corridor between the park boundary (Parkline) and Pohono Bridge from January 28 to February 12, 1997. A linear historic research record (Caputo and Jackson 1997) was completed for the roadway. Primary records (preliminary in form and content, Caputo and Jackson 1997) were completed for resources adjacent to the road. From March 12 to March 14, 1997, a cultural resources survey was conducted in eight areas (Carpenter 1997) identified for possible road realignment (six of which were selected for planned safety improvements) during the initial phase of emergency road repair (SAIC 1997).

Cultural resources investigations and documentation include full documentation, historical background documentation, determination of significance, determination of eligibility for listing on the National Register of Historic Places, determination of potential effects posed by planned construction, as well as the presentation of various measures to mitigate the effects of adverse impacts. Field work involved intensive surface surveys within the project area, resulting in documentation of located cultural sites, features, and artifacts. Surveys and historic documentary research were conducted within the guidelines of the Secretary of Interior's standards and related NPS management policies and guidelines.

4.2.2 BACKGROUND

A total of six cultural sites are currently recorded within the project area and are subject to evaluation. These include three prehistoric sites within the Cascades area, one prehistoric / historic site located between the junction of El Portal and Big Oak Flat Roads and Pohono Bridge, one prehistoric / historic site in El Portal, and the primary subject resource of this project, El Portal Road. Cultural resources documented during the initial survey include 284 historic period features and artifacts. Additionally, the survey noted, but did not fully document 24 potentially separate cultural resources in the vicinity of the road. A summary of these resources is included in a later section of this chapter.

As summarized earlier in this document (along with thorough treatment in Quin 1991 and in Caputo 1997), the presumed early trails in the canyon were improved for horse, wagon, and foot traffic in the 1860's and early 1870's. Construction of a wagon road from El Portal to the junction with the Coulterville Road was accomplished by the Yosemite Valley Railroad, beginning in 1905. Improvements were made to the road during the period of 1913 to 1918, when, during the latter year, the first of a vast number of hand-laid stone retaining and parapet walls were built.

Major reconstruction of the road from El Portal to Yosemite Village began in 1925 with asphalt paving east of Pohono Bridge and concrete surface west of the bridge to El Portal. This construction phase included widening and straightening of the alignment along with the installation of new stone parapet guardwalls, cobble gutters, retaining walls, stone water catchments, corrugated metal culverts, and other features.

Substantial flooding of the Merced River in 1924, 1937, 1950, 1955, 1964, 1969, 1983, and 1997 along with various rock slides, have closed the road and required varying levels of reconstruction of the road and its related features. The road was last resurfaced in 1977 with the installation of modern subsurface sewer lines to El Portal. However, with all of the repairs, maintenance, and reconstruction during the past 80 years, the road has not been substantially widened or realigned since the 1920's. Today, the importance of El Portal Road to many visitors is that of a roadway with a unique blend of scale, rustic rock work, slow meandering curves, an intermittent canopy of natural vegetation in comfortable scale with the size and alignment of the road, plus views of the Merced River and its canyon.

4.2.3 Initial Archeological Surveys of Road Corridor

Archeological and historical studies previous to this EA have resulted in the recording of several sites and features, as well as a wide array of historical documentation regarding the construction and use of the road and associative structures. Historical and ethnographical overviews are included in works by Napton (1978), Greene (1987), and Quin (1991). These documents summarize the protohistoric use of the area by Native Americans as well as subsequent development of early park facilities and related activities. Included within these works are references to various general and specific information about El Portal Road and associated sites. Archeological surveys by James Bennyhoff in the 1950's, L. Kyle Napton (Napton, et al 1978) in the 1970's, and various NPS archeological crews during the 1980's (Baumler and Carpenter 1982, Riley 1984) and 1990's have added to the documentation of the limited number of sites listed in this study.

In preparation for emergency road repair following the January 1997 flood, NPS cultural resources crews undertook the first comprehensive cultural resources survey specific to the entire El Portal Road corridor from the park boundary (Parkline) to Pohono Bridge (Caputo 1997). This work provides the foundation for all cultural resources planning, investigations, and compliance documentation related to this project.

During March 1997, a team of archeologists was assigned to conduct specified field investigations, recording, and impact assessments for planned safety improvements to El Portal Road (Carpenter 1997, SAIC 1997). This project was limited to surveying and documentation of cultural features in six specific improvement areas (totaling approximately one-half mile in length) of the entire El Portal Road. The project documented seven potentially historic stone road drainage structures, one historic granite quarry, and one short segment of potentially historic trail. Documentation of these features was supplemented with correspondence from the Superintendent, Yosemite National Park, for concurrence from the California State Historic Preservation Officer (SHPO) and the Advisory Council on Historic Preservation. The NPS, SHPO, and Advisory Council concurred that the planned safety improvements would have no adverse effect on properties potentially eligible for national register consideration.

Historical records documentation, background research, and further field reconnaissance is currently underway within the project area to document all cultural resources. Such documentation will support a determination of eligibility for listing for El Portal Road and a determination of effect for the proposed action on El Portal Road and related cultural sites on the National Register of Historic Places. Findings from these determinations will be incorporated into this document and provided as an appendix prior to the finalization of this EA. These determinations may lead to the development of additional measures to mitigate impacts to cultural resources from the reconstruction of the road.

4.2.4 Summary of Cultural Resources

A total of six cultural resources sites are known within the project area: three recorded prehistoric period sites; two combination prehistoric/historic sites; as well as the primary subject resource of this project, El Portal Road. A summary listing of the resources follows:

Site Designation	**Site Type/Brief Description**
CA-MRP-55	Prehistoric/protohistoric (possible historic component), four boulder mortar features, two possible rock shelters, possible midden area, possible house site, bisected by existing road.
CA-MRP-241	Prehistoric (possible protohistoric/ historic component), two boulder mortar features, one rock shelter, bisected by existing road.
CA-MRP-242	Prehistoric (possible protohistoric component), one boulder mortar feature.
CA-MRP-369	Prehistoric (possible protohistoric component), two boulder mortar features, bisected by existing road.
Y97B-1	Historic El Portal Road extending from the park boundary at El Portal to Pohono Bridge, includes 284 recorded historic period features and 11 artifacts.
CA-MRP-250	Large prehistoric/historic habitation with 15 bedrock mortar features, human remains, located at former NPS shooting range.

The initial archeological survey of El Portal Road from the park boundary (Parkline) to Pohono Bridge resulted in the identification and recording of 284 features and 11 artifacts or artifact concentrations all related to the road as a recorded cultural resource (Caputo 1997). Included in the range of features are those elements in direct association with the road such as culverts, drainage structures, parapet guardwalls, retaining walls, utility vault (manhole) covers, old road surfaces, traffic pullouts, and the like. The list of artifacts includes isolated remnants of corrugated metal pipe, heavy wire and cable, and assorted cans, bottles, and historic period ceramics.

Additionally, the survey identified, but did not fully document or record 24 additional historic period cultural resources or sites which potentially can be classified as independent of the road. Such sites and structures include remains of stone foundations for undetermined structures, possible privy depressions, foot paths and trails, early and distinctly different road alignments, as well as major extant structures such as the power house, various historic structures in the Cascades area, and the remains of a blacksmith shop near the junction and historically associated with the Old Coulterville Road. A list of these 24 sites follows:

Site Designation	**Brief Description**
Y97B-2	Historic trash scatter
Y97B-3	Historic rock quarry
Y97B-4	Arch Rock Entrance Station complex, listed on Natl. Register
Y97B-5	Sections of older road bed
Y97B-6	Remains of historic blacksmith shop
Y97B-7	Aligned rock structure pad
Y97B-8	Wood shed associated with penstock
Y97B-9	Unmaintained foot trail
Y97B-10	Power House Complex, some HAER recording exists
Y97B-11	Historic camp with aligned rock foundation stones
Y97B-12	Cascades Falls Trail
Y97B-13	Rock alignment associated with former road alignment
Y97B-14	Privy remains
Y97B-15	Penstock supports
Y97B-16	Cascades Diversion Dam complex
Y97B-17	Remains of CCC Camp at Cascade Falls picnic area
Y97B-18	Historic Structure, NPS Bldg. #8528, DOE completed

Y97B-19	Historic Structure, NPS Bldg. #8506, DOE completed
Y97B-20	Historic Structure, NPS Bldg. #8490, DOE completed
Y97B-21	Historic Structure, NPS Bldg. #8486, DOE completed
Y97B-22	Historic Structure, NPS Bldg. #101, DOE completed
Y97B-23	Possible privy remains
Y97B-24	Pohono Pit Quarry used for construction of El Portal Road
Y97B-25	Older sections of El Portal Road alignment

While some information exists, a comprehensive analysis of the significance of El Portal Road has not been completed. The initial survey and historical documentation, in addition to previous cultural resources recording, has resulted in various levels of documentation of the noted sites and features. Historic structures such as the Arch Rock Entrance Station complex, the four historic residences at Cascades, the Power House complex, penstock, and Cascades Diversion Dam have all been documented either as historic structures, National Register of Historic Places (NRHP) nominations, or through documentation for the Historic American Engineering Record (HAER). However, complete and consistent recording of the Merced River Canyon route does not exist, but is currently underway.

4.2.5 Evaluation for National Register Eligibility

Along the El Portal Road corridor, there exists a complex myriad of cultural resources ranging from several hundred or even thousand years of prehistory to the recent historic period of park development of the early 20th century. The 284 recorded road features and the 24 potentially independent sites exhibit a diverse range of documentation. In order to provide a consistent and rational basis for determining the significance of the individual cultural resources and assessing the level of impacts of any proposed construction and related use, a consistent and reliable level of documentation is necessary. Work is underway concurrently with the preparation of this EA to complete field recording and historical research. Completion of this work will provide the aforementioned rational basis for effective cultural resources management.

Following the completion of research and documentation, a Determination of Eligibility will be prepared for listing the various cultural resources of the El Portal Road corridor on the National Register of Historic Places (NRHP). Those resources and components that are determined to be eligible for listing will then be documented with the NRHP process and an assessment of effects of proposed reconstruction and related impacts will be prepared.

4.2.6 *Significance of Cultural Resources*

It is apparent from initial field surveys and historical documentation that the El Portal Road corridor contains potentially significant vestiges of historical access and use of the Merced Canyon and Yosemite Valley. Prehistoric habitations and food-processing areas, historic work camps, early electrical power generating equipment, remnants of earlier historic roads and trails, plus the continually used and maintained fabric and landscape of the existing alignment of El Portal Road all contribute to the road's significance.

In his documentation of the historic stone walls and rock work along the Glacier Point Road in Yosemite National Park, Harlan D. Unrau (1990) stated: "...While the [Glacier Point] stone work and rock walls possess substantial integrity, they are not among the most significant, best preserved, and most extensive examples of such historic resources along park roads in Yosemite National Park. The best and most prominent examples of such resources in the park, including hand-laid rock walls as well as cutstone bridges, culvert headwalls, and tunnels, are found along portions of the Big Oak Flat, El Portal, and Wawona Roads." (Unrau 1990:76-77)

Through examination of historical records, design, construction methods, fabric and materials, workmanship, and other factors, the primary historical themes evident for El Portal Road include: 1) transportation to the park, 2) road construction, damage, and repair, and 3) significance of the roadway to park development (e.g., year round access to Yosemite Valley and hydroelectric power generation). The road has been used, maintained, and repaired on a regular basis throughout its existence, resulting in varying degrees of integrity loss to some individual features and structures. However, as a complete corridor unit, the roadway possesses unique traits that contribute to its historical significance. Such traits demonstrate high degrees of integrity to alignment, width, and character.

Preliminary historical background research pertaining to the construction of El Portal Road and associated structures indicates that specific records, details, and dates of maintenance and repair efforts are largely non-existent (Snyder, personal communication). Only through general historical documentation, physical and historical context, associative artifacts and technologies, and other methods can the general sequence and historical development of the road be documented. In fact, exact construction dates of individual features such as guardwall segments and particular pullouts may never be determined more specifically than a range of 10 to 20 years.

The drainage catchments, parapet guardwall segments, rock quarries, and other structural elements comprise the linear composition of El Portal Road. These features contribute to the overall integrity of location, design, setting, materials, workmanship, feeling, and association. These features embody the distinctive characteristics of type,

One of the more elaborate drainage catchments along El Portal Road.

period, or method of construction (ACHP). As individual attributes these elements do not possess either the substantial levels of integrity or historical importance to establish significance. The existence of these attributes during the continual use and maintenance of El Portal Road over the past 90 years contributes to the road's significance.

4.3 Visitor and Park Use

4.3.1 Land Use

The majority of the land immediately surrounding the park is publicly owned by the U.S. Forest Service (USFS). The four national forests surrounding the park include the Stanislaus, Toiyabe, Inyo, and Sierra. These lands are managed for general forest, wilderness, or dispersed recreation use and are receiving increasing demands for recreational resources (NPS 1994). The region surrounding Yosemite includes six counties: Mariposa, Tuolumne, Madera, Mono, Alpine, and Inyo. Cooperative planning efforts between federal, state, and county agencies within the region have addressed critical natural, cultural, and recreational resource concerns and management policies. Interagency groups have been developed by Yosemite management to coordinate long range planning activities with surrounding land owners and land management agencies.

The majority of all land within the park is classified wilderness. As part of the California Wilderness Act in 1984, Congress designated 94.2 percent of the park (704,624 acres) as wilderness and 1.5 percent (11,200 acres) as potential wilderness additions (NPS 1994).

Increased demands for lodging, camping, restaurants, and other park services have resulted in full capacities daily during late spring, summer, and early fall. Due to a limited number of park facilities, visitors are increasingly using accommodations outside the park. Small towns and communities such as El Portal, Mariposa, Groveland, and Oakhurst lie within the nearby the periphery of Yosemite and provide shopping, lodging, and general services for visitors traveling on the major access routes to the park. Many park and concession employees live in these small towns and commute to the park daily.

4.3.1.1 Merced River Canyon

The Merced River Canyon exists in a valley designated by the park as natural environment. This zone is managed for the preservation, protection, and interpretation of cultural resources and their settings while providing for visitor use and enjoyment (NPS 1994). Limited structures such as El Portal Road, visitors access point, electrical substation, and park offices exist within the Yosemite stretch of this corridor. The majority of the canyon is undisturbed and considered a scenic and biological park resource and is a designated wild and scenic river.

The El Portal Road corridor is one of the most important and highly traveled gateways for vehicle passengers enroute to and from to Yosemite. The community of El Portal lies just outside of the park on Highway 140 and provides lodging and services for visitors driving to and from the park on Highway 140 and El Portal Road. The Highwater 97a flood caused extensive damage to several structures within El Portal, namely the lodging and visitor facilities immediately adjacent to the park boundary on Highway 140.

4.3.2 Utilities

The Merced River Canyon is the main utility corridor to Yosemite Valley. The utility corridor includes sewage, electric, and phone lines which extend from El Portal to the valley. From the valley, the sewer line is a steel 12-inch force main pipe which extends to Cascades. From that point, the line is gravity flow and terminates at the waste water treatment plant located in the park administrative area at El Portal. The sewer line is 16 inches in the valley and through El Portal in gravity flow areas. The line is encased in concrete 18 inches to 3 feet below the road surface. From El Portal, a 70,000 kV above ground power line carries electricity to the Powerhouse in Merced Canyon. From there, a 12,000 kV buried line carries power to Yosemite Valley. Also underground, for the entire length of El Portal Road, are concrete pull boxes with two (currently empty) six-inch PVC conduits. These concrete pull boxes are 400 feet apart and can provide access to underground utilities. The main phone line from El Portal to Yosemite Valley is a microwave transmission. An above ground phone line on the north side of El Portal Road is a secondary line from the microwave station (receiver) at Turtleback to Arch Rock and the Cascades buildings. Penstock remnants exist from the Cascades Diversion Dam to the Powerhouse.

4.3.3 *Transportation*

The speed limit on the roadway is posted at 35 mph; however, the posted speed limit for buses is 25 mph, essentially limiting all traffic to 25 mph when buses are present. Lower advisory speeds are posted on several curves.

The intersection of El Portal and Big Oak Flat Roads is a three-legged “Y” intersection. A relative high number of accidents have occurred at this location. Drivers turning left off of Big Oak Flat Road, have to look behind themselves for vehicles on El Portal Road before turning. (Traffic approaching from El Portal Road usually falls within the blind spot of these turning vehicles.) Right turning vehicles off of Big Oak Flat Road onto El Portal Road have to make a sharp turn to complete the turning movement. These turns are too sharp for most larger vehicles to complete in one movement. The difficulty to successfully complete turn movements at this intersection is likely the cause of many accidents.

4.3.4 *Visual Resources*

Yosemite National Park was established primarily for its natural and scenic features. The scenery of the park attracts millions of visitors to Yosemite each year. Yosemite is an outstanding example of the major stages of the earth’s evolutionary history, containing a combination of high peaks, sheer cliffs, massive granite domes, magnificent waterfalls, expansive wilderness, and giant sequoias. Yosemite Valley, a unique natural feature, contains many of the world’s highest known waterfalls as well as El Capitan, Half Dome, and Mount Watkins, three of the largest exposed monoliths of granite in the world (Adams 1963). Conserving the scenery of national parks is a fundamental purpose in the 1916 organic act, as well as a purpose of this park under its enabling legislation.

The scenic resources of the Merced River Canyon are striking. The steep mountain setting and rough canyon topography combine with cool, clean air, spectacular rock formations, and panoramic canyon views. For the most part, the existing road does not dominate the visual setting of Merced River Canyon. Eleven scenic vistas were identified in the General Management Plan (NPS 1980) as the most important in Yosemite Valley. El Portal Road is not visible from any of these scenic vistas.

4.3.4.1 *Wild and Scenic River*

In 1987 Congress designated the main stem (channel) and south fork of the Merced River under the Wild and Scenic Rivers Act. This placed approximately 71 miles of the main stem of the Merced River (from its headwaters near Mount Lyell to Bear Creek near Briceburg) under protection. The act requires three types of management parameters: classification by river segment (wild, scenic, or recreational); determination of the river corridor (its "related adjacent land area"); and a listing of the "outstanding remarkable values" of the river and its corridor that must be protected.

River segment classifications are primarily based on the degree of development along the river. Scenic designation is given to rivers or sections of rivers that are "free of impoundments, with shorelines or watersheds still largely primitive and shorelines largely undeveloped, but accessible in places by roads" (16 USC). Segment corridor widths may be up to a maximum of 0.25 mile from each bank of the river (or 320 acres of land per running river mile). Outstanding remarkable values are those resource values that the agency must protect or enhance in the corridor. Primary management guidance is provided by the "National Wild and Scenic Rivers System; Final Revised Guidelines for Eligibility, Classification and Management of River Areas," which was published in 1982 (Federal Register Vol. 47, No. 173).

As outlined in the Yosemite Valley Housing Plan (NPS 1996), for the Merced River along El Portal Road, the classifications and corridors are shown in Table 4.3 and the outstandingly remarkable values are shown in Table 4.4.

Table 4.3. Classifications and Corridors for the Merced River along El Portal Road

Segment Name and Number	Description of Segment	Classification	Corridor (related adjacent land area)
Yosemite Valley (2)	Wilderness boundary above Nevada Falls to top of pool at old hydropower impoundment	Scenic	From swinging bridge at Leidig Meadow to top of pool at old hydropower impoundment: 0.25 mile on both sides of river
Diversion Dam (3)	Top of pool at old hydropower impoundment to 200 feet below dam	Recreational	0.25 mile, both sides of river
Merced River Gorge (4)	200 feet below dam to western park boundary	Scenic	0.25 mile, both sides of river

Table 4.4. Outstandingly Remarkable Values of the Merced River along El Portal Road

Segment Name and Number	Outstanding Remarkable Values (by category)
Main Stem Merced River	*Scientific* (entire river) - The river, including the adjacent land area, is a significant scientific resource; it is a watershed entirely within wilderness or Yosemite National Park, invaluable for baseline scientific studies.
Yosemite Valley (2)	*Scenic* - Interface of river, rock, and forest throughout. *Geologic Processes/Conditions* - Largest glaciated valley in Sierra Nevada with a meandering river; medial moraines. *Air Quality* - Mandatory Class I airshed under the Clean Air Act. *Recreation* - Hiking, picnicking, camping, fishing, photography, sightseeing. *Biologic* - Exceptionally large stands of black oak for the Sierra Nevada; riparian areas provide rich wildlife habitat; rare wildlife species: peregrine falcon, spotted owl, golden eagles, 17 possible bat species; one of two Merced River segments with indigenous trout. *Cultural* - Numerous archeological sites; identified as a primary habitat of prehistoric people; riparian areas contain traditionally used plants; significant prehistoric trail junction; first land area and river designated for preservation in U.S.; historical resources and landscapes. *Hydrologic Processes* - World class waterfalls; flood regime.
Diversion Dam (3)	*Scenic* - Views of Pulpit Rock and Rainbow View. *Geologic Processes/Conditions* - Transition from U-shaped, glaciated valley to V-shaped river gorge. *Air Quality* - Mandatory Class I airshed under the Clean Air Act. *Recreation* - Sightseeing, fishing, photography. *Biologic* - Riparian wildlife habitat; indigenous rainbow trout. *Hydrologic Processes* - Change in gradients from mature river in the valley to young river in the gorge.
Merced River Gorge (4)	*Scenic* - Views of the Cascades, Wildcat Falls, Tamarack Creek Falls, The Rostrum, and Elephant Rock; the V-shaped gorge; the river and its cascades. *Geologic Processes/Conditions* - Transition from U-shaped, glaciated valley to V-shaped river gorge. *Air Quality* - Mandatory Class I airshed under the Clean Air Act. *Recreation* - Picnicking, climbing, fishing, photography, and sightseeing. *Biologic* - Diverse riparian areas intact and almost entirely undisturbed; extremely unusual canyon live oak woodland research area; indigenous rainbow trout. *Cultural* - Archeological sites in the Cascades area. *Hydrologic Processes* - Change in gradients from mature river in the valley to young river in the gorge.

4.3.5 SOCIOECONOMIC

In terms of socioeconomic impacts, the affected environment for the purposes of this assessment has been determined to be the counties of Madera, Mariposa, and Tuolumne, California. All of these counties include parts of Yosemite National Park and are dependent, to varying degrees, on tourism related to the park for portions of their annual income. The three main access roads to the park pass through these counties; namely Route 120 through Tuolumne, Route 140 through Mariposa, and Route 41 through Madera and Mariposa. Another entrance lies to the east of the park in Mono County but impacts on this entrance are expected to be limited because this is the only route into the park from the east, it is closed part of the year due to snow, and it would not be directly affected by the work being considered in this assessment.

Madera, Mariposa, and Tuolumne counties are relatively small in terms of population with an average population of about 55,000. However, they have all been growing faster than other parts of the state. From 1980-1992, the population in these three counties grew by an average of 48 percent while the state grew by 30 percent (U.S. Department of Commerce, 1994). All three counties have higher unemployment rates and lower per capita incomes than the state averages.

4.3.5.1 MADERA COUNTY

Madera County lies to the south and west of Yosemite. While it is the largest of the three counties in terms of population, it has a relatively small population of about 99,023, and a low population density of 46 per square mile versus the California average of 198 (U.S. Department of Commerce 1994). The sources of income in Madera County are widely distributed with farming being the largest (Table 4.5).

Table 4.5 Sources of Personal Income in Madera County (1990 Census Data)

Source of Income	$ in millions	% of Total
Services	$123.8M	15.9%
Government	$126.9M	16.3%
Construction and Mining	$ 52.9M	6.8%
Retail Trade	$ 71.6M	9.2%
Manufacturing	$126.1M	16.2%
Finance, Insurance & Real Estate	$ 17.1M	2.2%
Other Services	$ 84.1M	10.8%
Farming	$175.6M	22.6%
Totals	$778.1M	100.0%

As shown in Table 4.6, Madera County has a high unemployment rate. For the past several years, it has been nearly double California's rate, and while California's rate has dropped by over 16 percent since 1994, Madera's rate has remained relatively steady dropping by less than 5 percent. Typical of rural areas with high unemployment rates, Madera County's per capita income is low. Madera's average compared to the California average is $13,897 versus $20,689 (U.S. Census 1990).

Table 4.6 Average Madera County Unemployment Rate versus California Average

Year	Madera County Annual Average Unemployment Rate	California Annual Average Unemployment Rate	Percentage Change in Average Unemploymen Rate from Madera County to California
1996	14.1%	7.2%	95.8%
1995	15.0%	7.8%	92.3%
1994	14.8%	8.6%	72.1%

Source: California Employment Development Department, Labor Market Information Division, March 21, 1997

4.3.5.2 Mariposa County

The majority of Mariposa County lies due west of Yosemite and much of the park resides in the county. It is a sparsely populated county (population 15,338) with an average population density of only 11 people per square mile versus the California average of 198 (U.S. Department of Commerce 1994). It is the smallest of the three counties in the affected environment of this assessment. The sources of personal income in Mariposa County are dominated by the services industry and government spending (Table 4.7). The county's economy does not enjoy the diversity of Madera County and farming is a very small segment of Mariposa County's economy. Moreover, much of the income produced in the county is dependent on services and activities related to tourism in Yosemite National Park.

Table 4.7. Sources of Personal Income in Mariposa County (1990 Census Data)

Source of Income	$ in millions	% of Total
Services	$123.8M	15.9%
Government	$126.9M	16.3%
Construction and Mining	$ 52.9M	6.8%
Retail Trade	$ 71.6M	9.2%
Manufacturing	$126.1M	16.2%
Finance, Insurance & Real Estate	$ 17.1M	2.2%
Other Services	$ 84.1M	10.8%
Farming	$175.6M	22.6%
Totals	$778.1M	100.0%

Notes:

[1] Primarily from hotels and lodging.

[2] Currently over 34 percent of the government sector is the Federal Government. (California Employment Development Department, Labor Market Information Division, March 1997) Nearly all of the Federal Government activities are related to Yosemite National Park.

As shown in Table 4.8, Mariposa County also has a high unemployment rate when compared to the California average, but it is not nearly as high as Madera County's. While California's rate has dropped by over 16 percent since 1994, Mariposa's rate has dropped by just over 6 percent. Mariposa County's per capita income is also lower than the California average is $16,172 versus $20,689 but higher than Madera County's (U.S. Census 1990).

Table 4.8 Average Mariposa County Unemployment Rate versus California Average

Year	Mariposa County Annual Average Unemployment Rate	California Annual Average Unemployment Rate	Percentage Change in Average Unemployment Rate from Mariposa County to California
1996	8.8%	7.2%	22.2%
1995	9.4%	7.8%	20.5%
1994	9.4%	8.6%	9.3%

Reference:

California Employment Development Department, Labor Market Information Division, March 21, 1997

4.3.5.3 Tuolumne County

Tuolumne County lies to the north and west of Yosemite. It is the largest of the three counties in terms of area, but its population is less than that of Madera County, 50,757 versus 99,023 (U.S. Department of Commerce 1994). The sources of personal income in Tuolumne County are more similar to Mariposa County than they are to Madera County although the county's economy is not as heavily dominated by the services industry and government spending as Mariposa's economy (Table 4.9).

Table 4.9 Sources of Personal Income in Tuolumne County (1990 Census Data)

Source of Income	$ in millions	% of Total
Services[1]	$ 61.2M	47.6%
Government[2]	$ 36.9M	28.7%
Construction and Mining	$ 8.9M	6.9%
Retail Trade	$ 7.7M	6.0%
Manufacturing	$ 4.4M	3.4%
Finance, Insurance & Real Estate	$ 3.3M	2.6%
Other Services	$ 3.3M	2.6%
Farming	$ 2.8M	2.2%
Totals	$128.5M	100.0%

Notes:
[1] Primarily from hotels and lodging.
[2] Currently over 34% of the government sector is the Federal Government. (California Employment Development Department, Labor Market Information Division, March 1997) Nearly all of the Federal Government activities are related to Yosemite National Park.

As shown in Table 4.10, Tuolumne County also has a high unemployment rate compared to the California average, higher than Mariposa County but not as high as Madera County. While California's rate has dropped by over 16 percent since 1994, like Mariposa County Tuolumne's rate has dropped by just over 6 percent. Tuolumne County's per capita income is also significantly lower than the California average is $14,824 versus $20,689 but higher than Madera County's (U.S. Census 1990).

Table 4.10 Average Tuolumne County Unemployment Rate versus California Average

Year	Tuolumne County Annual Average Unemployment Rate	California Annual Average Unemployment Rate	Percentage Change in Average Unemployment Rate from Tuolumne County to California
1996	10.2%	7.2%	41.7%
1995	10.9%	7.8%	39.7%
1994	10.9%	8.6%	26.7%

Source: California Employment Development Department, Labor Market Information Division, March 21, 1997

5.0 Environmental Consequences

5.1 *Natural Resources*

5.1.1 *Geology and Soils*

5.1.1.1 *No Action*

No action entails maintenance of the existing roadway. The current disturbed footprint of El Portal Road encompasses approximately 22 acres of surface soils from existing pavement and guardwall structures. This alternative would preclude additional disturbance to rock and soil. Existing cut and fill slopes would remain, most of which are relatively natural appearing cut-slope rock, revegetated cut and fill slopes, or dry stack rock fills. Fractured rock, some of which is scarred with drill holes from previous construction activities, would also remain. No action would perpetuate unstable road base, shoulder, cut and fill slope areas where aging, poor drainage, road design, and flooding have caused permanent pavement and road base damage, as well as slumping and erosion of cut and fill slopes. These are current maintenance and safety problems. Drainage would continue to be problematic because existing culverts are not located in positions advantageous to existing geology and topology.

5.1.1.2 *11 ft. Travel Lanes (Proposed Action)*

The current disturbed footprint of El Portal Road encompasses approximately 22 acres of surface soils from existing pavement and guardwall structures. Improvements to El Portal Road associated with the 11 ft. travel lane alternative would have long-term impact to approximately five additional acres of surface soil from the expanded footprint of the roadbed. This represents a 22 percent increase of roadway footprint. Reconstruction would involve expanding existing cuts into decomposed rock / soil and enlarging existing rock / soil fills.

Areas affected by cut slope (and some areas affected by fill slope) would be revegetated with native vegetation as part of the proposed action. This temporary impact would not alter the overall biotic composition Merced River Canyon. This would temporarily expose new soil surface within the construction limits. Temporary impacts to soil surfaces would be mitigated as soon as practicable. Drainage would be significantly improved and measures such as retaining walls, rock rip rap, revegetation, and other techniques would be used to stabilize new cuts and fills. Construction operations could contribute to temporary erosion / sedimentation until slope stabilization / revegetation is accomplished. Impacts to visual resources are discussed later in this section and revegetation is discussed in Section 6.1. Application of mitigation measures during and after the construction period would assure that construction-related impacts on geology and soil resources would be minimized as much as practicable and would not be significant.

5.1.1.3 12 Ft. Travel Lanes with 2 Ft. Shoulders

The current disturbed footprint of El Portal Road encompasses approximately 22 acres of surface soils from existing pavement and guardwall structures. Improvements to El Portal Road associated with 12 ft. travel lanes and 2 ft. shoulders would impact approximately 11 additional acres of surface soil from the expanded footprint of the roadbed. This represents a 50 percent increase in surface disturbance beyond the 22 acres of existing paved and / or developed surface area. Potential impacts from this alternative are similar to the 11 ft. travel lane alternative described above. The 50 percent increase in long-term disturbed soil / rock would result from wider cuts into decomposed rock / soil and larger rock / soil fills. This is a 5 to 10 percent greater increase in temporary impacts to adjacent soil / rocks than the 11 ft. travel lane alternative. Application of mitigation measures during and after the construction period would assure that construction-related impacts on geology and soil resources would be minimized as much as practicable and would not be significant.

5.1.2 Hydrology and Water Resources

5.1.2.1 No Action

No action would maintain the existing river, drainage streams, and water quality. No construction would occur under no action, therefore there would be no construction-related impacts to the riparian corridor. Natural impacts would continue to occur. Erosion of existing bare or sloughing road cuts and fills would continue to add turbidity and sediment to the river and streams. Moderate to major erosion would continue to occur during flood events. Due to the generally low erodability of the soils in the projects area, minor erosion is not currently a major problem. However, during flood events, moderate to major erosion would continue to be a significant problem to the structural integrity of the roadway.

5.1.2.2 11 ft. Travel Lanes (Proposed Action)

Existing road fill (drystack and mortared rip rap) already encroaches on the river channel, and may be constraining it. Roadway widening has the potential to further encroach and constrain the river channel. However, by moving the centerline, constructing away from the river, steepening the road fill, and using retaining walls to restrict the width of fills, encroachment on the river would be limited. Throughout the majority of the construction area, reconstruction activities would preserve and protect the riparian area to every extent possible. In isolated areas there may be an impact due to elimination of some riparian resources. There would be no encroachment on any tributary streams, except to cross them at existing road crossings. Such crossings would be accomplished under applicable permitting procedures (refer to Section 8.0 Regulatory Compliance). Turbidity of water would be visually monitored during construction and supplemented with instrumented monitoring when necessary. The contractor would be required to comply with all applicable federal and state water quality standards.

There would be short-term impacts to soil and vegetation; however, all of these areas would be restored by revegetation.

A single isolated wetland area exists within the area approximately one quarter mile downstream from Pohono Bridge on the south side of the Merced River. This wetland area is not located within the proposed construction area. There would be no construction-related impacts to this site.

The reconstruction of the roadway would not significantly change the 100-year floodplain of the river and would not increase the risk of flooding to persons, properties, or structures along the roadway. The project would improve drainage by increasing the size and number of culverts along the roadway. The new culverts and drainage ditch would provide improved flow capacity; thus, reducing current problems where plugged, insufficient capacity, or poor design cause water to damage the roadway. The improvements would reduce the risk of flood damage and eliminate maintenance problems. Application of mitigation measures during and after the construction period would assure that construction-related impacts on hydrology and water resources would not be significant.

5.1.2.3 12 Ft. Travel Lanes with 2 Ft. Shoulders

Potential impacts from this alternative are identical to the 11 ft. travel lane alternative described above. Application of mitigation measures during and after the construction period would assure that construction-related impacts on hydrology and water resources would not be significant.

5.1.3 Air Quality

5.1.3.1 No Action

Under no action, there would be no impact to air quality.

5.1.3.2 11 ft. Travel Lanes (Proposed Action)

Minor, temporary increases in fugitive dust and volatile organics from construction activities would occur. This includes dust from blasting during rock removal. Dust would be controlled by the application of water and other approved methods. Overall, construction activities are considered temporary and would not jeopardize compliance with federal and state air quality standards.

Use of a portable concrete batch plant during construction is anticipated. Mariposa County Air Pollution Control District (APCD) Rule 401 requires approval of an Authority to Construct to install such equipment. Before a concrete batch plant can be operated, a Permit to Operate, as required under Mariposa County APCD Rule 501, must be obtained. Section 118 of the Clean Air Act requires all federal facilities to comply with existing federal, state, and local air pollution control laws and regulations. Upon completion of the project, the batch plant would be removed and the disturbed area returned to pre-construction conditions. The NPS would work with the Mariposa County APCD to ensure that all construction activities meet district requirements.

If a new stationary source (such as a batch plant) would emit more than 250 tons per year (tpy) of a criteria pollutant, it would be considered a major source and would be subject to federal Prevention of Significant Deterioration (PSD) regulations. However, a portable concrete batch plant such as would be used for the proposed action would not exceed the threshold of 250 tpy for any pollutant; thus, it would not be considered a new major stationary source nor would it be subject to PSD regulations.

There could be an improvement in air quality near Arch Rock since vehicles would no longer be idling in this area because under the proposed action, the entrance station would be relocated to the park boundary (Parkline). Application of mitigation measures during and after the construction period would assure that construction-related impacts on air quality would be minimized as much as practicable and would not be significant.

5.1.3.3 12 Ft. Travel Lanes with 2 Ft. Shoulders

Potential impacts from this alternative are identical to the 11 ft. travel lane alternative described above. Application of mitigation measures during and after the construction period would assure that construction-related impacts on air quality would be minimized as much as practicable and would not be significant.

5.1.4 Noise

5.1.4.1 No Action

Under no action, there would be no impact to noise.

5.1.4.2 11 ft. Travel Lanes (Proposed Action)

Although noise effects on the human population of El Portal and Mariposa is likely to be minimal, there is the possibility that noise would effect wildlife in the vicinity of blasting sites. The potential effects vary widely by species, and many species adapt to a remarkable degree. The least significant effect is usually a temporary threshold shift in which an animal's sensitivity to low intensity sound increases during exposure, but returns to normal after exposure.

Sound exposure has also been shown to disrupt behavior patterns of animals. However, wild animals are not confined. When subjected to high noise levels, most animals leave the area and so are unlikely to be exposed to noise levels with significant potential to damage hearing. However, behavioral disruption is a possibility. It is unlikely that birds, bats, or larger mammals would remain in the vicinity of blasting areas. Due to the temporary and short duration of blasting events and the relative isolation from residential areas, no significant impacts to the environment resulting from noise would occur as a result of the proposed action.

5.1.4.3 12 Ft. Travel Lanes with 2 Ft. Shoulders

Potential impacts from this alternative are identical to the 11 ft. travel lane alternative described above. Due to the temporary and short duration of blasting events and the relative isolation from residential areas, no significant impacts to the environment resulting from noise would occur as a result of the proposed action.

5.1.5 *Vegetation*

5.1.5.1 *No Action*

No action would maintain the existing cleared road corridor and abutting vegetation. Existing long-term impacts are approximately 22 acres of roadway pavement or developed surfaces. A corridor averaging 25 feet wide was originally cleared in the 1920s, but has since revegetated. The existing condition with vegetation immediately adjacent to the road is scenic, but creates maintenance problems for hazard removal crews and safety hazards for drivers.

5.1.5.2 *11 ft. Travel Lanes (Proposed Action)*

The current disturbed footprint of El Portal Road encompasses approximately 22 acres of surface soils from existing pavement and guardwall structures. The proposed 11 ft. travel lane alternative would directly impact approximately five acres of vegetation in the road corridor, and adjacent areas affected by cut slopes, drainage features, or erosion control and fill activities. Construction staging areas would impact an additional two acres. These impacts are short-term and affected areas would be revegetated or restored to pre-construction activities as part of the mitigation process. Permanent vegetation losses would be restricted to the widened roadbed and its associated drainage features, guardwalls, and turnouts. Care is being taken in project planning to preserve as many mature trees as possible during project construction (Fritzke 1997).

Areas affected by cut slope (and some areas affected by fill slope) would be revegetated with native vegetation as part of the proposed action. This temporary impact would not alter the overall biotic composition of the Merced River Canyon. The natural communities of the Merced River are adapted to a volatile natural environment characterized by floods, wildfire, and rockslides. These events regularly destroy much or most vegetation in areas of direct impact. The vegetation in the project area is therefore very resilient. This natural resilience, coupled with an adequate budget for revegetation and control of non-native (exotic) species, would, in the opinion of Yosemite Flood Recovery management staff, ensure that long-term impacts of the proposed action on vegetation in the project area would not be significant (Johnson 1997; Fritzke 1997). Application of mitigation measures during and after the construction period would assure that construction-related impacts on vegetation resources would be minimized as much as practicable and would not be significant.

5.1.5.3 *12 Ft. Travel Lanes with 2 Ft. Shoulders*

The proposed 12 ft. travel lane with 2 ft. shoulder alternative would directly impact approximately 33 acres of vegetation in the road corridor itself or in adjacent areas affected by cut slopes, drainage features, or erosion control and fill activities. This is a 50 percent increase above existing long-term disturbed areas. Additional potential impacts and mitigation measures from this alternative are similar to the 11 ft. travel lane alternative described above. Application of mitigation measures during and after the construction period would assure that construction-related impacts on vegetation resources would be minimized as much as practicable and would not be significant.

5.1.6 Wildlife

5.1.6.1 No Action

No action would maintain the current conditions of the road relative to wildlife. El Portal Road is narrow; rock cuts and vegetation encroach near the travel lanes and often obscure sight distance. These conditions are hazardous for crossing wildlife as well as motorists. Currently, there are few wildlife roadkills mainly because of the low design speed, even lower hazardous curve speeds, and low average vehicle speed on many parts of the existing road.

5.1.6.2 11 ft. Travel Lanes (Proposed Action)

Impacts to wildlife would be proportional to the amount of habitat lost. These impacts to wildlife from the proposed action would result from both construction-related factors and long-term changes in road conditions. Direct impacts of construction would include temporary loss of den and nest habitat on rock slopes and in snags, trees and bushes, loss of cover, and reduced forage (Thompson 1997). These impacts would be due to blasting, cut slopes and fills, and drainage / erosion feature construction. Over time , however, these habitats would redevelop. Some incidental direct wildlife mortality can also be expected as a result of the construction activity.

Indirect impacts to wildlife would also occur as a result of construction activity. Some indirect impacts might result from blasting noise, and the spread of dust and debris. These indirect impacts (particularly noise) would affect a larger area and might result in nest or den abandonment and reproductive failure (Thompson 1997).

Caution would be exercised to avoid or mitigate both direct and indirect impacts during nesting season, especially during nest initiation and pre-fledging phases (Thompson 1997). Application of mitigation measures during and after the construction period would assure that construction-related impacts on the general wildlife population would not be significant.

5.1.6.3 12 Ft. Travel Lanes with 2 Ft. Shoulders

Potential impacts from this alternative are identical to the 11 ft. travel lane alternative described above. Application of mitigation measures during and after the construction period would assure that construction-related impacts on the general wildlife population would not be significant.

5.1.7 Sensitive Species

5.1.7.1 No Action

Under no action, there would be no impacts to sensitive species.

5.1.7.2 11 ft. Travel Lanes (Proposed Action)

The El Portal Road corridor was surveyed in 1997 for sensitive plant species that might be affected by the proposed action. More than 400 individual Tompkin's sedge plants were located near the road corridor, but no examples of other sensitive plants were found (Fritzke 1997). Plans for implementing the proposed action include transplanting most of the Tompkin's sedge, which has good transplant survival rates, out of the directly impacted areas as part of the overall revegetation plan for the project (Fritzke 1997). If examples of other sensitive species are found during the course of construction, mitigation activities would be undertaken that are appropriate to the species and the likely impacts.

No data exist that suggests that the proposed action would impact sensitive wildlife species in the area. A Biological Assessment (BA) is being prepared throughout the construction area to address the sensitive species listed in Table 4.1. Results from this BA would determine whether or not sensitive species exist in the immediate area and develop mitigation measures to assure that construction activities would not significantly impact any sensitive species that may occur in the area.

Possible impacts to sensitive bird species that have been documented to nest or forage in or near the project area are similar to those listed above in Section 5.1.6 above, and similar mitigation measures are appropriate (Thompson 1997). However, owls are particularly susceptible to vehicle collisions, because they often forage along road corridors (Thompson 1997). To the extent that owls nest and / or forage in the project area, they may be disproportionately subject to collision-related mortality due to higher road speeds and / or more and larger vehicles using the improved road. Application of mitigation measures during and after the construction period would assure that construction-related impacts on sensitive species would be minimized as much as practicable and would not be significant.

5.1.7.3 12 Ft. Travel Lanes with 2 Ft. Shoulders

Potential impacts from this design alternative are identical to the 11 ft. travel lane alternative described above. Application of mitigation measures during and after the construction period would assure that construction-related impacts on sensitive species would be minimized as much as practicable and would not be significant.

5.2 Cultural Resources

The projected environmental consequences of the proposed alternatives are as varied as the complex range of the resource types. Depending upon the development of specific design/construction plans, a potential exists for impacts to cultural features. There is also a possibility that individually insignificant features which contribute to the total significance of the cultural site of which they are a part may also be affected.

5.2.1 No Action

While this alternative has no construction impacts, continual deterioration of historic features and fabric of site Y97B-1, El Portal Road, would continue. Such deterioration would be the result of continued use, maintenance, and localized repair of the road, retaining walls, parapet guardwall, stone drainage headwalls, and related elements of the existing road corridor. Such deterioration of historic fabric is unavoidable with continued use of the road, and is only lessened by the implementation of a program to stabilize and maintain road structures as historic fabric.

5.2.2 11 ft. Travel Lanes (Proposed Action)

Potential consequences on cultural resources which may result from this alternative include impacts to various structures and features of site Y97B-1, El Portal Road, including removal of parapet guardwalls, stone retaining walls, stone drainage catchments for culverts, historic segments of road alignment, etc. Additional impacts to the historical landscape and related cultural resources of the existing road would result due to changes in the historic elements of the road such as scale of the road geometry, physical relationship of the existing road characteristics (road width and alignment, size and scale of rock walls, natural fabric of structures and features, vegetation canopy and screening, etc.). This change in historic fabric is unavoidable with continued use of the road, and is only lessened by the implementation of a program to stabilize and maintain road structures as historic fabric. Potential impacts may occur to site CA-MRP-55 and subsurface remains (if they exist) if road reconstruction occurs in this specific site area. Potential impacts may also occur to sites CA-MRP-241, -242, -369 if the roadway is widened in specific site areas. Subsurface cultural deposits and artifacts may exist within the proposed road corridor and have the potential to be disturbed or destroyed from construction activities if proper mitigation is not performed. Application of mitigation measures during and after the construction period would assure that construction-related impacts on cultural resources would not be significant.

5.2.3 12 Ft. Travel Lanes with 2 Ft. Shoulders

Potential impacts from this alternative are identical to the 11 ft. travel lane alternative described above. Application of mitigation measures during and after the construction period would assure that construction-related impacts on cultural resources would not be significant.

5.3 Visitor and Park Use

5.3.1 Land Use

5.3.1.1 No Action

Under no action, there would be no impact to land use.

5.3.1.2 11 ft. Travel Lanes (Proposed Action)

The proposed action would not change land use trends or conditions within the construction area or along the Merced River Canyon. Relocation of the Arch Rock Entrance Station would have a beneficial impact on El Portal Road traffic conditions throughout the year, but particularly during the peak visitor months. The proposed entrance station location, the relatively flat park boundary (Parkline) site, offers substantially more acreage for vehicles and buses, and can accommodate three fee collection booths. As a result, entrance station relocation would have the effect of minimizing traffic delays while waiting to enter the park. The addition of rest room facilities would also have a beneficial impact to land use. Overall, there are positive impacts to land use resulting from the proposed action.

5.3.1.3 12 Ft. Travel Lanes with 2 Ft. Shoulders

Potential impacts from this alternative are identical to the 11 ft. travel lane alternative described above. Overall, there are positive impacts to land use resulting from this alternative.

5.3.2 Utilities

5.3.2.1 No Action

Under no action, the sewer line would be repaired / replaced as necessary. Work on the electrical system would be completed as described in a separate environmental document (NPS 1987, NPS 1995). The Cascades Diversion Dam would be removed as described in separate environmental documents (NPS 1987, USGS 1989).

5.3.2.2 11 ft. Travel Lanes (Proposed Action)

There are no significant impacts to utilities resulting from the proposed action. As under no action, the sewer line would be repaired / replaced as necessary. Work on the electrical system would be completed as described in a separate environmental document (NPS 1987, NPS 1995). The Cascades Diversion Dam would be removed as described in separate environmental documents (NPS 1987, USGS 1989). Telephone lines could be placed underground.

5.3.2.3 12 Ft. Travel Lanes with 2 Ft. Shoulders

Potential impacts from this alternative are identical to no action and the 11 ft. travel lane alternative described above. There are no significant impacts to utilities resulting from this alternative.

5.3.3 Transportation

5.3.3.1 No Action

Under no action, the existing road structure would continue to serve as a park entrance and receive routine roadway maintenance. Under no action, there would be no changes to El Portal Road or its role as part of the park's transportation system. Therefore, it is unlikely that any changes in the travel patterns of visitors would occur. The safety improvements occurring during emergency repair to El Portal Road would make six portions of the roadway safer (SAIC 1997); however, the remaining portions of the roadway would continue to force drivers to contend with substandard geometric conditions and insufficient lateral clearance. Accident data shows accidents occurring at locations along the entire length of the roadway. Accidents would occur along the roadway as long as no improvements are made to road geometry and sight distance. Historically, the accident rate has increased as traffic volumes have increased. Under no action, the accident rate would to continue to increase as traffic volumes continue to increase.

Minor roadway repairs and construction activities would continue throughout the future to increase the safety and maintainability of the road. These activities, including the repair / replacement of the sewer line and the completion of the electrical system replacement, may result in short-term road closures or temporary traffic restrictions throughout the duration of maintenance and construction activities.

5.3.3.2 11 FT. TRAVEL LANES (PROPOSED ACTION)

Under the proposed action, the geometry and lateral clearance of the roadway would be improved. This would have a significant positive effect on safety. The improvements would slightly realign the roadway to decrease sharp curves and remove rock from the cut slope to increase the line of sight. The road centerline would be adjusted (moved towards the cut slope away from the river) consistent with survey data and field designs. Additional width and lateral clearance area would be added to the roadway cross section. Curves would be slightly flattened by increasing the radius, which decreases the degree of curvature. Radii would optimally be approximately 500 feet or greater; however, each curve location would be designed with a radius that maximizes safety while minimizing the area of surface disturbance and maintaining the visual characteristic of a curving park roadway. The roadway improvements would provide several more feet of lateral clearance. The increased lateral clearance would allow vehicles to stay to the right of the centerline in their own lane. This would reduce the number of accidents, especially sideswipe accidents. The roadway improvements themselves would not have an effect on the volume of future traffic that would use the roadway. At the completion of roadway improvements, speed limit restrictions for large vehicles and advisory speeds at current locations would be re-evaluated.

The proposed improvement at the intersection includes a wider approach with a channelized island for the Big Oak Flat leg of the intersection. The improvement would force a turning vehicle to become perpendicular to El Portal Road before turning onto the roadway. This would improve the sight distance for the left-turning driver and decrease the sharpness of the turn for right-turning drivers, making both turn movements easier to complete and the intersection safer. A safer intersection would result in a lower accident rate.

As previously discussed in Section 5.3.1, relocation of the Arch Rock Entrance Station would have a beneficial impact on El Portal Road traffic conditions throughout the year, but particularly during the peak visitor months. The proposed entrance station location, the relatively flat park boundary (Parkline) site, offers substantially more acreage for vehicles and buses, and can accommodate three fee collection booths. As a result, entrance station relocation would have the effect of minimizing traffic delays while waiting to enter the park.

The reconstruction of El Portal Road would have a temporary adverse effect on traffic patterns during construction. Based on 1993 traffic data and the access plan outlined in the proposed action section, approximately 50 percent of the existing fall through spring traffic would be accommodated by the restricted access plan. During the summer, there would be complete access (no construction); the road would be open and all traffic would be accommodated. From the fall through the spring, the approximately 50 percent of unaccomodated traffic would have to select a different travel route to enter or exit the park (Mariposa Grove or Big Oak Flat), wait for access (up to several hours), or not visit Yosemite National Park. This inconvenience could deteriorate visitor experience. However, it is likely that most visitors would understand that the roadway needs to be improved and that the inconvenience is only temporary. From the fall through the spring, assuming that all the diverted traffic uses either the Mariposa Grove or Big Oak Flat Entrance, these entrances could respectively experience 80 and 100 percent increases in entering and exiting vehicles. However, these volumes are only 60 and 70 percent of peak summer volumes. These impacts are expected to last the length of the project. Shortly after the completion of the project, travel patterns would return to pre-construction travel patterns.

The restricted access plan would require the queuing of vehicles on both sides of construction areas. The queuing location outside the park would occur at the western end of the construction zone at the park boundary (Parkline). Based on the access plan, the maximum queue at this location to accommodate an average winter's day's traffic is estimated to be one half mile in length. The queuing location inside the park would occur east of Pohono Bridge. The location for the queuing would be in the north (right) lane along Northside Drive starting at Pohono Bridge. The south lane (left) would be used for all other travel. The maximum queue at this location to accommodate an average winter's day's traffic is estimated to be three quarter of a mile in length. There are no significant impacts to transportation resulting from the proposed action.

5.3.3.3 12 Ft. Travel Lanes with 2 Ft. Shoulders

Potential impacts from this alternative are identical to the 11 ft. travel lane alternative described above. This alternative would have a safety improvement over 11 ft. travel lanes due to a one-foot travel lane increase in each direction and the presence of two 2-foot shoulders. The increased lateral clearance would make it easier for larger vehicles to stay on the right side of the roadway and would slightly reduce the number of accidents compared to the 11 ft. travel lane alternative. However, the increase in safety must be weighted against the increase in other impacts especially visual impacts to the historic and scenic road. The weighting of these impacts is discussed in other sections. There are no significant impacts to transportation resulting from this alternative.

5.3.4 *VISUAL RESOURCES*

5.3.4.1 *NO ACTION*

Under no action, there would be no impacts to visual resources from proposed construction activities.

5.3.4.2 *11 FT. TRAVEL LANES (PROPOSED ACTION)*

The proposed action would increase the visibility of the roadway, increase the presence of the built-up environment within the canyon, and open up canyon views. There would also be short-term visual impacts to cut slopes due to the removal of material including rock and vegetation. These short-term impacts would eventually be negligible after revegetation. Rock surfaces in some blasting areas would be treated to accelerate the weathering process and more quickly blend in to surrounding naturally weathered rock. Due to the existing nature of the canyon, the road would still be winding, relatively steep and narrow.

The proposed action would have no impact to the wild and scenic river status of the Merced River. The designation of the Merced River along El Portal Road is scenic with the exception of the Cascades Diversion Dam which is designated recreational. The proposed action would not change these designations. However, the removal of the diversion dam would upgrade that segment to scenic status.

The improvement of El Portal Road to an adequate width and alignment presents some difficult engineering problems as well as the potential for impacts to visual/scenic resources along the Merced River Canyon. During the preliminary development of the project, the NPS and other agencies reviewed the type of improvement proposed and developed a project which would provide the needed safety and structural improvements while protecting the scenic, recreational, natural, and cultural resources which are an important part of the road’s existence. Project development would continue to be coordinated with the interdisciplinary specialists of park staff; other federal, state, and local agencies; and the public.

In order to preserve existing scenic qualities after improvements are completed, construction activities would not be visually evident to the observer and would only repeat form, line, color, and texture which are already found in the landscape. Significant visual change in the qualities of size, amount, intensity, direction, pattern, etc., would not be evident. Reduction in contrasts and changes would be accomplished through site mitigation through design, during construction, or immediately after. Mitigation recommendations for scenic resources are discussed in Section 6.0.

Improvements to El Portal Road would require cutting into the hillslopes, filling on the downslopes, or a combination of cut and fill. New cuts and fills (if in soil) would be revegetated according to existing surrounding vegetation. Care is being taken in project planning to preserve as many mature trees as possible during project construction (Fritzke 1997). Road character defining rock features such as Dog Rock, Split Rock, and Arch Rock would not be affected by construction activities.

Park staff and involved agencies are committed to minimizing the visual impacts of the proposed action. Visual impacts would be considered and addressed in each stage of project development through project construction. Application of mitigation measures during and after the construction period would assure that the long-term construction-related impacts to visual resources would not be significant.

5.3.4.3 12 Ft. Travel Lanes with 2 Ft. Shoulders

Potential impacts from this alternative are identical to the 11 ft. travel lane alternative described above. Application of mitigation measures during and after the construction period would assure that the long-term construction-related impacts to visual resources would not be significant.

5.3.5 Socioeconomics

5.3.5.1 No Action

Under no action, existing socioeconomic conditions would continue for the park and surrounding areas. Without road improvements, El Portal Road would continue to be subject to damage and resulting closures from future floods of the Merced River. These potential future road closures would continue to adversely impact businesses and visitor related activities in the park as well as within the towns of El Portal and Mariposa.

In the long-term, the socioeconomic impacts associated with no action would be greater than the short-term socioeconomic impacts associated with the proposed action. Without the improvements, the road would continue to insufficiently accommodate large vehicle traffic including busses which would be used to transport travelers in an inevitable regional transportation system. This lack of sufficient infrastructure would impair the ability of the town of Mariposa to become a hub for park-related transportation.

5.3.5.2 11 ft. Travel Lanes (Proposed Action)

There are two different sets of socioeconomic impacts associated with the proposed improvements to El Portal Road. The first set of impacts are those directly associated with the actual work to be accomplished on the project. During the construction period, this work would result in additional spending in Mariposa County and, possibly in Madera and Tuolumne counties. Additional workers would be needed to make the improvements and materials would need to be procured to support construction. These impacts are expected to be positive in nature because additional work and spending would be coming into counties with high unemployment rates. The second, and potentially more significant, set of impacts are possible negative impacts on the affected environment if the proposed improvements to El Portal Road discourage travelers from visiting the park due to a variety of construction-related concerns (e.g., traffic jams, travel safety, etc.).

The access plan which includes complete summer access (no summer construction) and restricted winter access would assure that a continued flow of tourists, associated businesses and employees, and community interests are accommodated by El Portal Road.

Due to their proximity to Yosemite National Park, tourism has an impact on the economies of Madera, Mariposa, and Tuolumne counties; the size of impact varies by county. Mariposa County would probably be the most affected by the proposed improvements to El Portal Road. This is based on a number of factors:

The stretch of roadway that would be improved (El Portal Road) is located in Mariposa County.

Nearly all of the concessions in Yosemite National Park are within the boundaries of Mariposa County. Over 97 percent of spending in the park takes place in Mariposa County with the remainder taking place in Tuolumne County.

The two of the main entrances to the park, Highways 140 and 41, are located in Mariposa County. In 1993, an estimated 61 percent of the vehicles entering the park went through one of these entrances (BRW 1994).

Based on a study completed in 1992, of the peak season travelers to Yosemite who chose to stay outside the park in one of these counties overnight, over 67 percent stayed in Mariposa County.

Mariposa County experiences a relatively large fluctuation in its labor force and unemployment rate each year during Yosemite's peak tourism season while Madera and Tuolumne experience much smaller fluctuations. This indicates that Mariposa County's economy is more closely tied to Yosemite tourism than either Madera or Tuolumne County's. (Table 5.1)

Table 5.1

	Percentage Increase in Labor Force from Peak Tourism Months to Low Tourism Months	Average Unemployment Rate During Peak Tourism Months (May-October)	Downward Change in Unemployment Rate from Peak Tourism Months to Low Tourism Months
Mariposa	11.7%	6.4%	43.9%
Madera	4.7%	12.5%	20.9%
Tuolumne	2.8%	8.9%	21.2%

Source: Calculated based on information prepared by California Employment Development Department, Labor Market Information Division, March 21, 1997

Based on the points discussed above, any socioeconomic impacts resulting from the planned improvements to El Portal Road would be expected to impact Mariposa County most. Any actions taken to mitigate the possible negative impacts of the proposed action on Mariposa County would likely lessen the negative socioeconomic impacts on all three counties. Therefore, Mariposa County will be used as the case for the socioeconomic analysis in this assessment.

Socioeconomic Impacts on Mariposa County

As an indication of the impact of travel to Yosemite National Park on Mariposa County, there appears to be a strong correlation between visits to the park and seasonal fluctuations in Mariposa County's labor force and unemployment rate (Tables 5.2 and 5.3). Discussions with Mariposa County's Visitors Bureau indicate that these fluctuations are the result of increased hiring by park concessionaires and other related services during the peak tourism season (Case 1997).

Table 5.2 Seasonal Fluctuations in Mariposa County's Labor Force

Year	Average Labor Force During Peak Tourism Months (May-October)	Average Labor Force During Low Tourism Months (November-April)	Percentage Change in Labor Force from Peak Tourism Months to Low Tourism Months
1996	7942	7107	11.7%
1995	7963	7053	12.9%
1994	7828	6913	13.2%

Source: California Employment Development Department, Labor Market Information Division, March 21, 1997

Table 5.3 Seasonal Fluctuations in Mariposa County's Unemployment Rate

Year	Average Unemployment Rate During Peak Tourism Months (May-October)	Average Unemployment Rate During Low Tourism Months (November-April)	Percentage Change in Unemployment Rate from Peak Tourism Months to Low Tourism Months
1996	6.4%	11.4%	178%
1995	7.2%	11.9%	165%
1994	7.2%	11.9%	165%

Source: California Employment Development Department, Labor Market Information Division, March 21, 1997

Another indication of Mariposa County's reliance on Yosemite tourism is the increase in the county's unemployment rate since the flood took place in early January 1997, which severely limited access to the park. At the end of December 1996, Mariposa County's unemployment rate stood at 10.2 percent. After the flood, the rate more than doubled to 20.7 percent in January, and declined only slightly in February to 18.8 percent (California Employment Development Department 1997). January and February are historically high unemployment months in Mariposa County, but the levels seen so far in 1997 are higher than the any monthly rates experienced over the past 15 years. Table 5.4 shows the comparison of 1997 unemployment rates to the same period in 1996.

Table 5.4 Average Mariposa County Unemployment Rate Since Flood versus 1996 Rates

Average Unemployment Rate During January/February 1997	Average Unemployment Rate During January/February 1996	Increase in Unemployment Rate from January/February 1996 to January/February 1997
19.8%	14.4%	37.5%

Source: California Employment Development Department, Labor Market Information Division, March 21, 1997

Based on a survey of 58 businesses in Mariposa County, the county estimates that since the flood, its restaurants, retail stores, and related services have lost over 37 percent of their expected gross income. They further estimate that if access to the park via El Portal Road remains limited through September 1997 (which would not be the case), the impact on these businesses is expected to continue to be down by 33 percent. If El Portal Road is closed after Labor Day 1997 through Memorial Day 1998, the impact that these businesses would expect is over 31 percent (Mariposa County 1997).

Based on a study of travel spending in Mariposa County conducted by the California Division of Tourism from 1991 through 1994, annual travel spending in Mariposa County increased by an average of approximately 15 percent. This study indicates that in 1994 the total travel spending in Mariposa County was estimated to be almost $318 million dollars. Escalating this figure by the estimated annual growth rate of 15 percent, travel spending in Mariposa County in 1997, would have been expected to exceed $480 million. Based on the survey conducted by the Mariposa County Visitors Bureau, tourism-related businesses would expect to experience an average decrease of 33 percent as a result of disruptions in travel plans due to limited access on El Portal Road. Extending this figure to include lodging and the concession services in the park, Mariposa County businesses could stand to lose over $160 million for each year the road's access is severely limited. In terms of jobs, the California Division of Tourism study indicated that up to 4,500 jobs in Mariposa County were connected with the travel industry in some manner. A 33 percent decrease in jobs would mean the loss of 1,500 jobs in the county.

A socioeconomic loss of this magnitude would be expected to have a significant impact on businesses and their workers, such a loss would also have a large impact on Mariposa County. During 1993 and 1994, it is estimated that the county received almost 75 percent of its county government tax revenue from activities related to tourism (California Division of Tourism and California Department of Finance). On this basis, any prolonged shutdown of El Portal Road could have a significant socio-economic impact on the county itself.

Under the proposed action, no construction activities would occur on El Portal Road from Memorial to Labor Day Weekend during the peak tourism season and the road would be open to accommodate visitors and park employees. Since Mariposa County's tourism revenue is seasonal in nature, this would minimize socioeconomic impacts during the peak tourism revenue and employment season. Additionally, the revenue gains associated with the roadway improvements would offset some of the fall through spring socioeconomic impacts. It is estimated that the project would employ about 100 workers during construction periods.

Because a dollar spent on this project has a multiplier effect on the economy, additional benefits would be expected to accrue to the county's economy. Using regional multipliers developed by the Department of Commerce's Bureau of Economic Analysis, a "maintenance and repair construction" project of this size in California would be expected to result in a final output of about $72 million and to create about 218 jobs. In the short-term, however, the benefits that would accrue as a result of the proposed action would not be expected to offset the impacts to tourism-related businesses, its workers, and the county itself. Under the proposed access plan, there would be socioeconomic impacts resulting from the proposed action. Application of proposed traffic management plans and access schedules during the construction period, however, would assure that the long-term construction-related impacts to socioeconomic resources would not be significant.

5.3.5.3 12 Ft. Travel Lanes with 2 Ft. Shoulders

Potential impacts from this alternative are identical to the 11 ft. travel lane alternative described above. Under the proposed access plan, there would be socioeconomic impacts resulting from the proposed action. Application of proposed traffic management plans and access schedules during the construction period, however, would assure that the long-term construction-related impacts to socioeconomic resources would not be significant.

6.0 Mitigation Measures

6.1 Natural Resources

Mitigation activities would occur as part of the proposed action to reduce any potential impacts to natural resources to non-significant levels. Rock removal and blasting activities on cut slope areas have the potential to disturb and damage adjacent vegetation and habitat resources if not properly performed and monitored. A natural resource specialist would make periodic inspections to review the extent of impacts to the environment and make sure that the reconstruction activities do not escalate beyond the scope of the EA. Mitigation activities follow:

Spotted owls actively defend large breeding territories from February to September. Determine if spotted owls are present within 1,000 feet of blasting areas. If spotted owls are within 1,000 feet of blasting areas, take appropriate impact avoidance measures (i.e. no surface charges, drill holes at least 2 feet deep).

Flag or fence around construction zones to prevent disturbance outside the defined construction area. Conduct thorough survey for sensitive plants, bat roosts, nesting birds, and snails before any construction. Survey at least 20 feet outside the periphery of the construction zones. If sensitive species are located, develop and adopt appropriate species conservation measures in coordination with Yosemite natural resource staff.

Minimize surface disturbance to the greatest extent possible including minimizing excavation into tree drip lines, minimizing disturbance of riparian areas, and minimizing encroachment of the wild and scenic Merced River.

Salvage plants before construction. Where possible, to facilitate revegetation, establish a 2:1 slope to replace existing vegetated slopes. Revegetate cut and fill slopes and temporarily disturbed areas with native plant species indigenous to the local area.

Sensitive plants, such as this Thompkin's Sedge, would be salvaged and replanted.

Prepare and implement a revegetation and erosion control plan to be approved by Yosemite Flood Recovery natural resources specialist. The plan shall include: 1) species to be planted; 2) source of plant material (area from which seed or cuttings can be collected to protect genetic integrity of the local populations); 3) method of planting each species (e.g., direct seeding, direct cuttings, transplants propagated from seed or cuttings); 4) timing of planting and seeding; 5) method of protecting plantings from herbivory; 6) methods for control of exotic species: 7) provisions for supplemental water (if needed); 8) definition of planting zones (according to different environmental conditions along the roadway); 9) identification of suitable species mixes and planting densities (pounds of seed per acre; spacing between cuttings or transplants) for each planting zone; 9) provisions for erosion control.

Investigate methods to accelerate initial colonization of bare rock surfaces with lichens and mosses (and eventually higher plants). This may include applying nutrients and propagules of the species to the fresh rock surfaces, creating cracks and depressions in the rocks providing places for soil accumulation and seedling establishment, or other methods. Implement suitable methods as approved by Yosemite Flood Recovery natural resources specialist.

Provide incentives to contractor to minimize disturbed area.

Transplant any sensitive plants (particularly Tompkin's sedge) wherever possible using methods approved by Yosemite natural resource staff.

Determine if peregrine falcons have returned to Cascades eyrie. If peregrines are found to be present, no blasting would be conducted within 1,000 feet of nest site and helicopter activity in the area would be limited.

Money is currently budgeted in the road reconstruction project for revegetation, control of non-native vegetation, vegetation monitoring, and related activities. The availability of this funding is critical to the finding of no significant impact with regard to vegetation. The funding must be maintained intact.

Minimize importation of any outside soils. Try to limit soil import to material similar to native soils. No importation of metamorphic soils. Clean construction equipment before bringing into area to limit movement of exotic seeds into area.

Conduct appropriately timed wildlife survey(s) covering appropriate geographic extent to adequately document the presence (or lack thereof), distribution, and potential impacts of the proposed action on sensitive wildlife species for which insufficient data currently exist.

Minimize disturbance (especially noise) during nesting season, especially during nest initiation and pre-fledging periods.

The contractor shall salvage wood from trees and remove it from the project area. All brush and slash material shall be hauled to one of the park's three woodyards. The Prescribed Fire Management Office would burn these materials under existing agency guidelines and procedures Sterile rice straw may be applied to exposed slopes at a 4,000 pounds per acre (lbs/ac) application rate.

Rock and other materials shall be reused to the maxiumum extent possible.

Construction operations would include appropriate measures to minimize the amount of dust. The contractor shall have water trucks and spray equipment available for the duration of construction. Normal dust control and clean up methods would be used including spraying construction areas with water at least once in the morning and once in the evening. The construction operations shall be staged to minimize the *length of time that traffic would be carried on gravel surfaces before paving operations take place.*

Implement an erosion and sediment control plan designed to minimize runoff or sloughing of soil or sediment into the Merced River.

All construction equipment would be equipped with mufflers kept in proper operating conditions. Whenever possible equipment would be shut-off rather than allowed to idle.

Portable rest room facilities would be available to construction workers.

6.2 Cultural Resources

To assure that the overall historical appearance and setting of the road corridor would be preserved, certain measures would be taken during design and construction for this project. To mitigate the impacts to roadway features, the following measures are stipulated:

Prehistoric/Historic cultural features within the road corridor would be documented prior to construction.

Fully document all prehistoric/historic cultural features (including sites CA-MRP-55,241,242,369) within road corridor to OHP and NPS standards prior to construction, with site/feature forms and maps. Photographs will be produced to standards agreed upon by the NPS, SHPO, and the ACHP.

Retrieve all usable fabric materials (building stone, etc.) for rebuilding some drainage catchments, walls, and structures in the same style, design, and construction methods as the original features.

Build the stone parapet guardwalls where required to same historic appearance. Acceptable alternatives include stone veneer or simulated rock such as formliner or shotcrete.

Construction activities, especially those having a potential to impact cultural features would be monitored by a qualified archeologist as directed by Secretary of Interior and NPS standards.

If additional, previously unknown cultural resources are encountered during construction, work would be temporarily suspended in the immediate area to document discovered resources according to NPS standards as outlined in emergency recovery plans to be developed for the project.

6.3 VISITOR AND PARK USE

Construction operations would be staged such that the existing roadway remains passable to the extent possible. Mitigation activities would occur to reduce any potential construction impacts to non-significant levels. The project construction schedule, anticipated traffic delays, and hours of closure would be posted on both ends of the project. This information would also be published in local newspapers and TV/radio stations. Federal, state, and local agencies/groups (upon request) would be notified by the FHWA project manager of the upcoming project construction/road access schedule to minimize disruption of activities. Inconvenience to the public would be unavoidable, but would be minimized through careful design of the construction schedule and traffic control plan. The project manager would work closely with Park Staff, county officials, and residents/permittees to reduce delays and inconveniences as much as possible. Mitigation activities follow:

Access to El Portal Road would continue to be restricted for non-construction related vehicles while construction is underway.

Pilot car operation, flaggers, and other traffic management measures would be supplied by the contractor.

Appropriate signage would posted along Highways 140 and 49 outside the town of Mariposa to direct traffic and inform visitors of the road access schedule and alternate routes.

A public information campaign would be developed to provide up to date information about road access to park visitors and local residents. This includes using the Yosemite Area Transportation Information System radio messages and kiosks, distributing newsletters or bulletins to park visitors and local residents, and posting information on the Yosemite National Park Internet site.

During or shortly after the completion of road construction, implement the planned Vehicle Reservation System or an equivalent system designed to limit the number of vehicles using the reconstructed road.

Consult with business and community leaders in the Merced River Canyon, Midpines, and Mariposa about the potential impacts of road construction (closures, traffic delays, loss of business, any safety issues) on their communities. Minimize adverse impacts through construction scheduling to ensure that economic benefits of the construction activity accrue to the communities and businesses affected.

Provide adequate signage within the park especially along Northside Drive to direct El Portal Road traffic to the vehicle queue and other traffic around the queue.

To minimize the effect that the construction would have on Highway 120, the section of El Portal Road between Pohono Bridge and Highway 120 would be completed as quickly as possible, even if it requires more restricted access measures. This section of roadway provides access to Yosemite Valley from three of the four entrances to the park.

Blasting operations would be limited such that removal of rock fall from the roadway caused by each blast can be accomplished within a four hour period. Blasting operations would be scheduled to not interfere with convoy operation during the morning and evening commute period between El Portal and Yosemite Valley.

Care shall be taken to avoid over breaking existing rock that would remain. Where excess fracturing does occur, the remaining rock face shall be scaled to avoid future rock fall. Where possible the use of hydraulic splitting shall be used.

The contractor would establish a staging area for construction worker parking that does not interfere with operations of either construction or peak hour commute travel. Where appropriate carpooling would be encouraged.

6.4 SOCIOECONOMICS

Construction operations would occur under a D/B contract over two seasons (not including summers) to be completed as time efficiently as possible to minimize tourism and resident related impacts to the local community. Depending on the contractor's schedule, beyond the minimum access periods outlined in the access plan, the roadway would be accessible as possible (safety and costs permitting).

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7.0 Cumulative Impacts

7.1 Summary

The proposed action would make no significant contribution to cumulative impacts on the environment of Yosemite, providing that the mitigation measures specified in this document are implemented, and further, providing that the planned Vehicle Reservation System (or an equivalent system that accomplishes a similar or greater reduction in traffic within the park) is implemented during or shortly after the completion of road construction. Implementation of the mitigation measures would minimize the potential for the proposed action to make a significant contribution to cumulative impacts on natural and cultural resources and would preserve much of the historic and visual character and park-like 'feel' of the road, although many specific attributes would be destroyed by reconstruction. Implementation of the Vehicle Reservation System (or equivalent) would ensure that steadily increasing visitor interest and traffic volumes do not offset the increased design safety of the road and that the improved road does not encourage still higher volumes of traffic into areas that cannot adequately accommodate more vehicles.

7.2 Introduction

In recent decades, a number of sometimes contradictory trends have combined to establish the baseline cumulative environmental impacts at Yosemite National Park and in the surrounding region. Positive trends that have affected Yosemite include changes in national laws and regulations, special Congressional designation for key areas within Yosemite, better science and more useful data, and management efforts and activities specific to the park itself. Negative trends primarily relate to dramatic increases in visitation and automobile traffic in the park itself, plus continued growth in the population of the region surrounding Yosemite. In short, the natural environment and visitor experience of Yosemite are being improved by specific efforts directed at resolving and/or avoiding environmental problems, but at the same time, Yosemite is under increasing pressure from outside sources of air pollution and rapidly increasing visitation.

On the positive side, clean air laws and regulation have not only reduced air pollution from outside sources, but have also ensured that the increasing numbers of cars entering the park emit much less air pollution. Designation of much of Yosemite as protected wilderness and designation of the Merced River within the park as wild and scenic have significantly limited the potential direct human impact on Yosemite and the Merced River Canyon. A commitment to ongoing research, plus project-specific analyses such as those required under NEPA, have increased the understanding of the sensitive and unique natural resources of Yosemite, allowing better management decision-making. In turn, better management practices and plans have been implemented in a number of critical areas, guided by the 1980 General Management Plan and related planning documents. The number of structures within the park has been reduced, as has the potential for individual visitors to adversely impact cultural resources and natural resources ranging from air quality to vulnerable vegetation to sensitive species. Hydroelectric power is no longer generated within the Merced River Canyon, and sewage treatment and some administrative functions have been moved to El Portal, outside of the park's boundaries. Shuttle services have allowed the number of vehicles in some of the most sensitive areas of the park (like the Mariposa Grove and the east end of Yosemite Valley) to be dramatically reduced.

On the negative side, the number of visitors to Yosemite has increased fourfold in the last 40 years to more than 4 million visitors per year in more than 1.4 million vehicles (Information Services 1997). According to park staff (Johnson 1997; Butler 1997), the number of visitors Yosemite can accommodate without significant damage to the park's resources and visitor experience could still increase, although preferably during the shoulder seasons (e.g., fall and spring), but the number of vehicles already exceeds the reasonable capacity of the roadways and parking facilities within the park during peak periods (i.e., summer). Vehicles are the primary source of negative cumulative impacts ranging from safety concerns, to air quality impacts, to traffic jams, to viewshed clutter and visitor annoyance. Coupled with the trend toward greater visitation and vehicular traffic, the growth in population of the surrounding region is another major negative contributing trend to cumulative impacts within Yosemite. Approximately 70 percent of Yosemite's visitors are from California, thereby contributing to the majority of the vehicle traffic (Information Services 1997). Additionally, much of the air pollution at Yosemite originates in the San Joaquin Valley and San Francisco Bay area (BRW 1994).

7.3 NATURAL RESOURCES

7.3.1 GEOLOGY AND SOILS

While the proposed action would result in some displacement of rock and soil through blasting and earth-moving activities, this displacement would not make a significant contribution to cumulative impacts in a system characterized by relatively frequent rockslides and floods that move massive quantities of rock and sediment. If soils foreign to the project site are imported for fill material, there is some potential for providing sites for non-native vegetation to get established (refer to 7.3.5) (Fritzke 1997). Thus, balancing cut and fill on the project site would be important to limiting any such potential impact. Provided the mitigation measures described in Section 6.1 relating to non-native plants are implemented, imported soils would make no significant contribution to cumulative impacts.

7.3.2 *Hydrology and Water Resources*

Providing the proposed action minimizes further constricting the floodway of the Merced River, the contribution of the proposed action to cumulative impacts on hydrology and water resources would be insignificant to modestly positive. Proposed drainage improvements for the reconstructed road would reduce future damage to the road; much of the past damage resulted from washouts resulting from or started by upslope flows (Butler 1997). Future washouts and reconstruction (related debris and sediment transport) would be reduced by the proposed action. While this benefit might be significant economically, it is not a significant reduction to the cumulative hydrologic impacts on the Merced River Canyon, given the volatile and highly flood-prone character of the canyon.

7.3.3 *Air Quality*

The contribution of the proposed action to short-term impacts from airborne particulates is not expected to be significant given the construction practices that would be employed. Longer-term, given the ability of the reconstructed road to handle more buses and other large vehicles, the potential for a contribution to cumulative impacts on air quality in the Merced River Canyon and Yosemite Valley could become significant over time. This concern would be substantially reduced by implementation of the planned Vehicle Reservation System (or its equivalent), thereby reducing the total number of vehicles allowed into the park.

7.3.4 *Noise*

Short-term, noise levels would increase due to blasting and operation of construction vehicles. The impacts of construction noise would be limited geographically by the topography of the project site and are not expected to significantly impact the environment, provided the specified mitigation steps are taken to limit noise levels during nesting season (Thompson 1997). Longer term, the contribution of the proposed action to cumulative noise levels in the Merced River Canyon and Yosemite Valley could result from increased numbers of vehicles and more large vehicles. Provided the Vehicle Reservation System (or equivalent) is implemented, increases in cumulative noise levels would not be significant.

7.3.5 *Vegetation*

The environment of the Merced River Canyon, through which El Portal Road climbs from the park boundary (Parkline) to Yosemite Valley, evolved in and has adapted to conditions of massive, even catastrophic change. Under natural circumstances, episodic flooding, wildfire, and rockslides periodically destroy and provide the basis for renewal of large portions of the resilient natural communities within the canyon. Natural fire return intervals are estimated to range from 8 to 12 years for mixed conifer forest, to 20 to 30 years for chaparral, and to 20 to 50 years for oak woodland (NPS 1992). Major flood events regularly affect riparian areas and drainages. In this century, flooding significant enough to cause serious damage to El Portal Road has occurred an average of once a decade since the road was built. Small rockslides occur frequently, and larger rockslides have substantially reshaped portions of the canyon over time.

In response to these relatively frequent and forceful natural impacts, vegetative communities within the canyon have evolved to survive and thrive under conditions of severe and recurrent disturbance. Thus, although construction of the current El Portal roadbed was completed about 70 years ago, the natural vegetation of the canyon has reclaimed all but the roadbed itself and associated drainage features, erosion control features, and constructed turnouts. Indeed, much of the road has been protected from this natural reclamation process only by constant maintenance and reconstruction after floods and rockslides. Despite the road's construction in an era where little heed was paid to the environmental impacts of construction activity, the direct impact of the road on the vegetative communities in the canyon is currently restricted to little more than the average twenty-five foot width of the roadway itself.

The proposed action would widen the area of permanent impact of the roadbed by an average of approximately five feet, although the shorter-term impact would be much greater due to the uphill slope cuts that would be required. Nevertheless, by comparison with the impacts of the 1997 flood or the 1990 Arch Rock fire, the immediate contribution of the road widening to cumulative impacts would be relatively small.

In addition to the potential for impacts on native vegetation, the reconstruction of the road could provide the potential for opportunistic exotic species to get established within the park, thereby possibly increasing the cumulative impact of exotic species on the park environment. At present, intrusion of exotics into the Merced River Canyon has been mainly limited to the area below the Cascades, with serious non-native intrusion in the El Portal area (Fritzke 1997). Natural resource staff are planning carefully for the management of exotic plants during and after the proposed road reconstruction, and the budget for this effort is adequate, provided it remains intact (Fritzke 1997; Johnson 1997). Key steps in managing the non-native plant threat include limiting the importation of soils from outside the canyon, avoiding importation of soils not naturally found in the canyon, sterilizing any imported materials, cleaning equipment before it is brought into the area, revegetation with native species, monitoring revegetated areas and other potentially affected areas, and use of herbicides if needed to control exotics that do get established (Fritzke 1997).

Given the tenacity of the vegetative communities of the canyon, combined with the proposed revegetation program, plans for control of non-native species, and other mitigation measures discussed in this document, Yosemite natural resource staff (Johnson 1997; Fritzke 1997; and Jenkins 1997) are confident of the recovery of the native vegetation in the areas that would be disturbed by road construction. Thus, the long-term contribution of the proposed action to cumulative impacts on vegetation is not expected to be significant, provided the budget for revegetation and non-native plant control remains intact.

7.3.6 WILDLIFE

Lack of data on some species in the Merced River Canyon makes evaluation of potential contributions of the proposed action to cumulative impacts on those species difficult or impossible (van Wagtendonk 1997; Thompson 1997). Particularly with respect to some invertebrate and bat species (refer to7.3.7 below) that may rely on habitat provided by talus slopes and rockfalls in the canyon. Additional data are needed to determine the risk, if any, posed by the reconstruction of El Portal Road and associated upslope cuts. To insure that the contribution of the proposed action to cumulative impacts on these species is not significant, appropriately timed surveys must be conducted of the project area, and mitigation for significant potential impacts, if any, must be instituted. This is currently underway.

Contributions of the proposed action to short-term cumulative impacts on wildlife could result from increased noise levels during construction and from habitat disturbance resulting from construction. Noise could be a problem during nesting season for some birds, particularly during the nest initiation and pre-fledging phases (Thompson 1997). Avoidance of loud noise, especially from blasting, during these critical periods would prevent the construction activity from becoming a significant contributor to cumulative impacts affecting reproductive success for these birds. Some habitat disturbance would result from removal of vegetation and small crevices/caves in the expanded roadway corridor and on the cut slopes (Thompson 1997). However, this disturbance would be very limited in the long-run, as the permanent loss of vegetation and rock habitat would be limited to the roadbed and associated features, intrusion in the riparian corridor would be minimized, and an aggressive revegetation program would be pursued (Thompson 1997; Johnson 1997). Because the wildlife associated with the vegetative communities of the Merced River Canyon has evolved to thrive in an environment characterized by sudden and massive impacts of flood, fire, and rockslide, the short-term and long-term impacts of the road widening itself are not expected to significantly contribute to cumulative impacts on wildlife.

Levels of vehicular traffic, as well as the speed at which the traffic moves, could make a contribution to roadkill losses of wildlife. Increases in traffic volume impact all wildlife crossing the roadway or, in the case of some birds, flying along it. Increases in traffic speed result in more deaths and injuries to birds and animals that might otherwise be able to escape the oncoming traffic. Among the birds and animals most often struck by vehicles in the park are owls (which often forage along road corridors), Stellar's jays, robins, various small birds, bear, deer, squirrels, foxes, raccoons, ring-tailed cats, other small mammals, and snakes (Thompson 1997).

Roadway improvements of the proposed alternative would result in better horizontal and vertical alignment than currently exists. This would provide for improved sight distances allowing greater reaction time for drivers to respond to crossing animals. Improved sight distance is known to reduce accidents. Although higher vehicle speeds would increase the potential for more wildlife mortality, it is believed that improved visibility will offset the adverse effect of higher speeds. The existing winding road has extremely poor sight distances, which offer little time for motorists to avoid wildlife.

7.3.7 SENSITIVE SPECIES

Adequate data exist regarding the sensitive plants found in the project area, primarily due to a recent survey of the project corridor for Tompkin's sedge. During that survey, the survey team watched for other sensitive species that might be present in the area, but did not find any examples (Fritzke 1997; Johnson 1997). Provided the prescribed mitigation measures for Tompkin's sedge are implemented, the proposed action would not make a significant contribution to cumulative impacts on sensitive plant species.

For many sensitive wildlife species, adequate data do not exist to assess the potential contribution of the proposed action to cumulative impacts on those species. As indicated in Section 4.1.7, data regarding the status of many sensitive species in the project area are incomplete at this time. The lack of data affects most bat species and invertebrates, as well as a number of birds, mammals, and reptiles. Appropriate surveys (currently underway) need to be conducted to ascertain the presence or absence of these species, the potential for proposed action impacts or contributions to cumulative impacts on these species, and mitigation measures, if any, needed to minimize or eliminate any significant impacts to these species.

7.4 Cultural Resources

Cumulative impacts to the cultural resources along the road would result in the partial alteration of the original historical landscape of the road corridor as well as the composite nature of the road structures and historical attributes. Provided the historic character and park-like feel of El Portal Road and its associated guardwalls and other rock features are preserved when the reconstruction is complete, the contribution of the proposed action to cumulative impacts on cultural resources would be limited to the direct impacts on cultural resources described in Section 5.2.2. Following the mitigation measures described in Section 6.2 would diminish the effects of the proposed action to cumulative impacts.

7.5 Visitor and Park Use

7.5.1 Land Use

The contribution of the proposed action to cumulative land use impacts within and near Yosemite would primarily result from the enhanced capability of the improved road to carry large vehicles like buses and motor homes. With implementation of the Vehicle Reservation System (or equivalent), the improved road would enhance the ability of the park to accommodate large vehicles while limiting the total number of vehicles. The proposed action would therefore constitute a positive impact on land use related to vehicle movement and parking within park boundaries, while at the same time potentially increasing the demand for land uses relating to parking and shuttle services outside park boundaries. Without implementation of the Vehicle Reservation System (or equivalent), vehicle-related pressures on land use within the park would increase as traffic continued to increase, potentially resulting in more dangerous parking in unsafe areas and ‘wildcat’ pullouts in areas where the park has tried to limit access.

7.5.2 Transportation

Visitor numbers at Yosemite increased from just 31,000 in 1915, to 372,000 in 1935, to 1 million in 1955, to 2.6 million in 1975, to more than 4.1 million in 1995 (Information Services 1997). In 1995, these visitors occupied more than 1.4 million vehicles. In August of 1996, the number of visitors in a single month exceeded 700,000 for the first time, and approximately 246,000 vehicles entered the park, averaging more than 22,000 visitors and almost 8,000 vehicles per day (Information Services 1997). The number of visitors and, more specifically, the number of vehicles within Yosemite constitute the most significant cumulative impact to the environment and visitor enjoyment of the park (Johnson 1997; Butler 1997). During much of the peak season, the number of vehicles in the park exceeds the comfortable carrying capacity of the parking facilities and, at some times of the day, the roads.

Controlling the number of vehicles in the park is a primary management goal (Jenkins 1997). Park management had planned to implement a Vehicle Reservation System in 1997, but has delayed implementation of the system (or an equivalent traffic control system) until more thorough consultations with surrounding communities can be conducted (Jenkins 1997). The goal of these consultations would be to devise and implement a traffic control system that is as protective as possible of the economic interests of the surrounding communities while still establishing the controls over vehicle numbers that are necessary to preserve the park environment and visitor enjoyment.

The proposed action would facilitate implementation of a Vehicle Reservation System to restrict the numbers of vehicles within Yosemite by providing a road that is better designed and safer for the passage of buses and other larger vehicles. Because approximately 57 percent of all vehicles entering Yosemite exit the park via a different road (BRW 1994), significant changes to visitor behavior would be necessary if more than a minority of visitors are to be shuttled to and from their cars at remote staging locations. For this reason, the 1994 Alternative Transportation Modes Feasibility Study for Yosemite Valley (BRW 1994) focused on large-scale parking facilities within the park, with mass transit systems to move people around within Yosemite Valley. Absent a Vehicle Reservation System, large increases in vehicle entry fees, or some combination of both, the proposed action would likely result in continually increasing traffic on El Portal Road and an associated significant contribution to the cumulative impacts on the park environment and visitor experience resulting from vehicle numbers.

7.5.3 VISUAL RESOURCES

Short-term, the construction activity would result in significant changes to the slopes and vegetation visitors view as they travel on El Portal Road. Over a few years, provided the revegetation program is carried out as prescribed, most of the disturbance resulting from construction activity would become indistinguishable from nearby areas that have only experienced the recurrent natural disturbances characteristic of the project area. The visual character of the road itself, particularly the appearance of the distinguishing rock guardwall, would be preserved, although most of the existing anthropogenic rock features would be destroyed during construction. The removal of the Cascades Diversion Dam as discussed in seperate environmental documents (NPS 1987, USGS 1989) would have a positive impact to the wild and scenic Merced River. The segment of the river containing the impoundment (the diversion dam) would be upgraded in status from recreational to scenic. Overall,

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after a few years' recovery time, the cumulative visual experience of the road would not be significantly effected by the proposed action.

7.5.4 SOCIOECONOMIC

While the proposed action would have the economically beneficial effect of creating employment and service opportunities in nearby communities, it would also create some ongoing disruption to visitor patterns and tourism-related economic activity in the area, particularly for businesses in the Merced River Canyon and communities that rely on economic activity from traffic into Yosemite on Highway 140 (e.g., Midpines and Mariposa). Both the benefits of construction spending and the disruptions to tourism activity would be limited primarily to construction periods. Because the economic benefits are not likely to accrue to all of the businesses affected by the disruptions and because some businesses may already have been seriously weakened by the five-month closing of El Portal Road due to recent flood damage, the contribution of the proposed action to cumulative economic impacts on some businesses and communities is likely to be significant. Any businesses that do not survive the period of disruption would have an impact on their owners and employees that would last beyond the completion of the proposed action. For this reason, every effort would be made to limit road closures due to the proposed action and to schedule any necessary closures at times when they would have the least economic impact.

8.0 Regulatory Compliance

Actions taken by the NPS in connection with construction of the proposed roadway improvements will comply with all applicable laws, regulations, and executive orders. The following paragraphs describe applicable laws, regulations, and executive orders. Permits or approvals that may be required are also identified. The permits and approvals, responsible agencies, and regulatory authorities are summarized in Table 8.1.

National Environmental Policy Act (NEPA) of 1969 (42 USC 4341 et seq.). *NEPA was established to ensure that environmental consequences of federal actions are identified, documented, and considered in the decision-making process. Regulations implementing NEPA are set forth by the Council on Environmental Quality (refer to next paragraph).*

Council on Environmental Quality (CEQ) Regulations Implementing the National Environmental Policy Act (40 CFR Parts 1500-1508). *CEQ Regulations implementing NEPA establish the requirements for environmental assessments (EAs) and environmental impact statements (EISs) and the process by which federal agencies fulfill their obligations under NEPA. The Regulations also define such key terms as "cumulative impact", "mitigation", and "significantly" to ensure consistent application of these terms in environmental documents.*

Clean Water Act (CWA) of 1977 (33 USC 1251 et seq.). *The Clean Water Act provides for the restoration and maintenance of the physical, chemical, and biological integrity of the nation's waters. Section 404 of the Act prohibits the discharge of fill material into navigable waters of the United States, including wetlands, except as permitted under separate regulations by the U.S. Army Corps of Engineers (COE) and U.S. Environmental Protection Agency (EPA). An important aspect of the regulations is that discharges into waters of the U.S., and the placement of fill in wetlands in particular, should be avoided if there are practicable alternatives.*

- *Section 401 Water Quality Certification. Certification by the State Water Resources Control Board (SWRCB) that the project would be in compliance with established water quality standards is required under Section 401 of the Act before a Section 404 permit can be issued by COE.*

- *Section 404 Permit Application. A Section 404 permit application must be submitted to COE and approved prior to any discharge of fill material into navigable waters of the U.S. (*e.g.*, the Merced River or its tributaries).*

Clean Water Act Amendments of 1987. *The 1987 amendments to the Act required that the EPA establish regulations for the issuance of municipal and industrial stormwater discharge permits as part of the National Pollutant Discharge Elimination System (NPDES). Final EPA regulations were published in November 1990. Included in industrial categories are stormwater discharges associated with construction activities involving the* *disturbance of more than five acres of land. The SWRCB is the administering agency in the State of California.*

- *General Construction Activity Stormwater Permit.* *A Notice of Intent (NOI) for compliance with the State's General Construction Activity Stormwater Permit (California's method of compliance with the NPDES stormwater discharge requirements) must be submitted to the SWRCB, and a Stormwater Pollution Prevention Plan must be developed and approved by the SWRCB for construction activities affecting greater than five acres.*

Clean Air Act, as amended (42USC 7401 et seq.). *Section 118 of the Clean Air Act requires all federal facilities to comply with existing federal, state, and local air pollution control laws and regulations. The NPS would work with the Mariposa County Air Pollution Control District (APCD) to ensure that all construction activities meet all requirements.*

- *Authority to Construct.* *Use of a portable concrete batch plant during roadway construction is anticipated. Mariposa County APCD Rule 401 requires approval of an Authority to Construct to install such equipment.*

- *Permit to Operate.* *Before a concrete batch plant can be operated, a Permit to Operate, as required under Mariposa County APCD Rule 501, must be obtained.*

Endangered Species Act of 1973 (16 USC 1531 et seq.). *The Endangered Species Act protects threatened and endangered species, as listed by the U.S. Fish and Wildlife Service (USFWS), from unauthorized take and directs federal agencies to ensure that their actions do not jeopardize the continued existence of such species. Section 7 of the Act defines federal agency responsibilities for consultation with the USFWS and requires preparation of a biological assessment to identify any threatened or endangered species that is likely to be affected by the proposed action.*

- *Biological Assessment.* *The Biological Assessment may be undertaken as part of the agency's NEPA compliance documentation. This EA, when finalized, would provide the Biological Assessment required by Section 7 of the Endangered Species Act.*

- *Section 7 Consultation.* *If the biological assessment determines that the proposed action may adversely impact a threatened or endangered species or result in the destruction or adverse modification of critical habitat of such species, consultation between the NPS and the USFWS shall be carried out in accordance with Section 7 of the Endangered Species Act.*

National Historic Preservation Act of 1966 (amended). *Section 106 of the National Historic Preservation Act requires that federal agencies consider the effect of proposed actions on properties on or eligible for listing on the National Register of Historic Places (NRHP). Investigation and documentation is currently being conducted by the NPS and the SHPO to determine the El Portal Road NRHP eligibility pursuant to the Act and related policies, including NPS Management Policies, the Cultural Resources Management Guideline (NPS 28), and the Advisory Council on Historic Preservation's*

(ACHP) implementing regulations regarding "Protection of Historic Properties" (36 CFR 800).

- Determination of Eligibility. *If it is determined that El Portal Road is eligible for listing on the NRHP, the NPS, ACHP, and SHPO will assess the adverse effects of the proposed action and develop a Memorandum of Agreement that will specify how the adverse effects will be avoided, mitigated, or accepted.*

Executive Order 11988 - Floodplain Management. *This Executive Order requires federal agencies to evaluate the potential effects of actions they may take in a floodplain to avoid, to the extent possible, adverse effects associated with development of a floodplain. If a proposed action will be located in or will affect a floodplain, the agency shall prepare a floodplain assessment. The floodplain assessment may be undertaken as part of the agency's NEPA compliance documentation.*

Porter-Cologne Water Quality Control Act (California Water Code, Section 13020). *Under the authority of the Porter-Cologne Act and the federal Clean Water Act, Regional Water Quality Control Boards (RWQCBs) act as regional agencies for the State Water Resources Control Board and are responsible for regional enforcement of water quality laws and coordination of water quality control activities. The regional board for the Yosemite area is the Central Valley RWQCB.*

California Streets and Highways Code. *The California Streets and Highways Code does not apply in areas of federal jurisdiction, but any activity outside the park boundary would be subject to the code. Section 660 of the Code specifies the requirements for Encroachment Permits for any action within a state highway right of way.*

- Encroachment Permit. *If road construction signs are needed along State Highway 140 outside the park boundary to warn approaching motorists of the construction zone, the NPS will obtain the required Encroachment Permit from Caltrans District 10.*

Table 8.1 Permits and Approvals Required

Permit or Approval / *Regulatory Authority*	Responsible Agency
Water Resources (Discharge of Fill Material into Waters of the U.S.)	
Section 401 Water Quality Certification *Clean Water Act, Section 401*	State Water Resources Control Board
Section 404 Permit *Clean Water Act, Section 404*	U.S. Army Corps of Engineers
Water Quality (Discharge of Stormwater Runoff into Waters of the U.S.)	
General Construction Activity Stormwater Permit *Clean Water Act Amendments of 1987*	State Water Resources Control Board
Air Quality (Concrete Batch Plant Emissions)	
Authority to Construct (portable concrete batch plant) *Mariposa County APCD Rule 401*	Mariposa County APCD
Permit to Operate (portable concrete batch plant) *Mariposa County APCD Rule 501*	Mariposa County APCD
Biological Resources (Threatened and Endangered Species)	
Biological Assessment (included in this EA) *Endangered Species Act, Section 7*	U.S. Fish and Wildlife Service
Section 7 Consultation (pending biological assessment) *Endangered Species Act, Section 7*	U.S. Fish and Wildlife Service
Cultural Resources (Historic El Portal Road)	
Determination of Eligibility (for listing on the NRHP) *National Historic Preservation Act, Section 106*	State Historic Preservation Officer
Traffic/Transportation (Construction Signs Outside Park Boundary)	
Encroachment Permit (State Highway 140) *Streets and Highways Code, Section 660*	Caltrans District 10 (Stockton)

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10.0 Acronyms and Abbreviations

Acronym	Abbreviation
AASHTO	American Association of State Highway Transportation Officials
ACHP	Advisory Council on Historic Preservation
CEQ	Council on Environmental Quality
cfs	cubic feet per second
CO	carbon monoxide
COE	U.S. Army Corps of Engineers
dBA	weighted decibel
EPA	U.S. Environmental Protection Agency
ERFO	Emergency Relief for Federally Owned Roads
FHWA	Federal Highways Administration
HABS/HAER	Historic American Building Survey/Historic American Engineering Record
lbs/ac	pounds per acre
LOS	level of service
mph	mile per hour
NAAQS	National Ambient Air Quality Standards
NHPA	National Historic Preservation Act
NO_2	nitrogen oxide
NPS	National Park Service
O_1	ozone
OHP	Office of Historic Preservation
Pb	lead
PM_{10}	10 microns
ppm	parts per million
SHPO	State Historic Preservation Office
SO_2	sulfer dioxide
$\mu g/m^3$	micrograms per cubic meter
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
Yosemite	Yosemite National Park

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